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COVER STORY

The Switch Is On

Three Tales From The ATM Proving Grounds

ALSO INSIDE

Do You Match The CIO Profile?

Argonne National Laboratory's
Timothy C. Kuhfuss

AN INTERNATIONAL DATA GROUP PUBLICATION

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CIO

VOLUME 9, NUMBER 1

Peering into the future
Cover photo by Greg Gillis **46**

COVER STORY

ATM UPDATE **46**

The Switch Is On

The world may not be quite ready for ATM at the desktop. But as prices begin to drop, standards start to gel and client/server applications ratchet up the demand for bandwidth, IS executives would be wise to heed these tales from the front.

By E.B. Baatz

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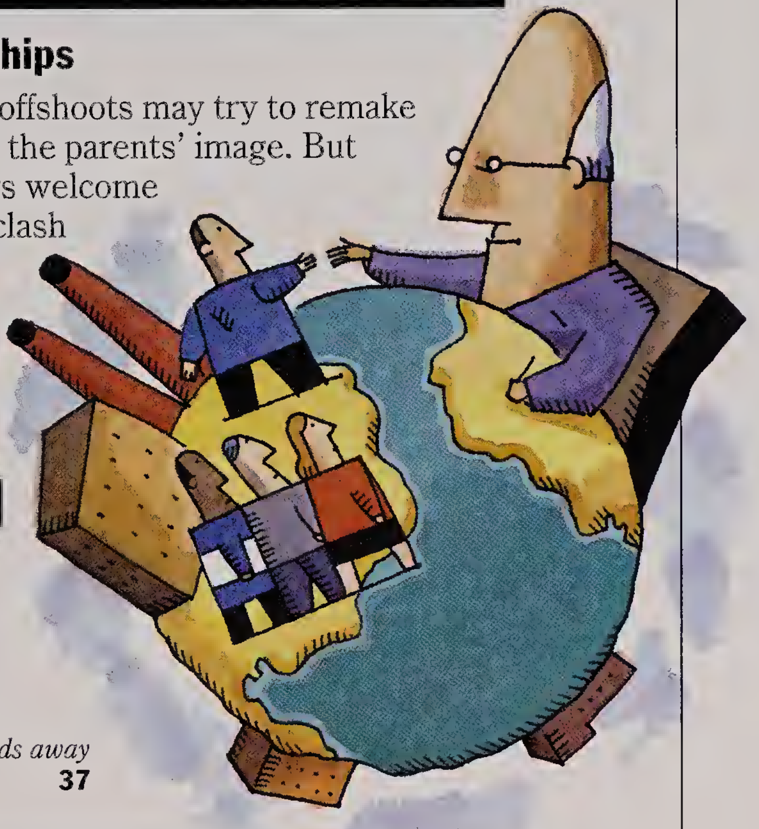
THE GLOBAL ENTERPRISE **37**

Long-Distance Relationships

Foreign companies with U.S. offshoots may try to remake their American workforces in the parents' image. But while some American workers welcome these changes, the resulting clash of cultures can leave others frustrated and confused.

By Anne Stuart



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Competing Interests

Operational excellence may be at the heart of much of today's business thinking, but it has little to do with what it takes to make a company truly successful.

By Richard Pastore

STRATEGIC SYSTEMS REVISITED **72**

Déjà View

CIO has examined many organizations as they launch major strategic-system implementations. But work continues on these systems long after the ink dries on the magazine's pages. Here we offer an update on efforts at Sallie Mae, Ryder and Gallup.

By Peter Fabris

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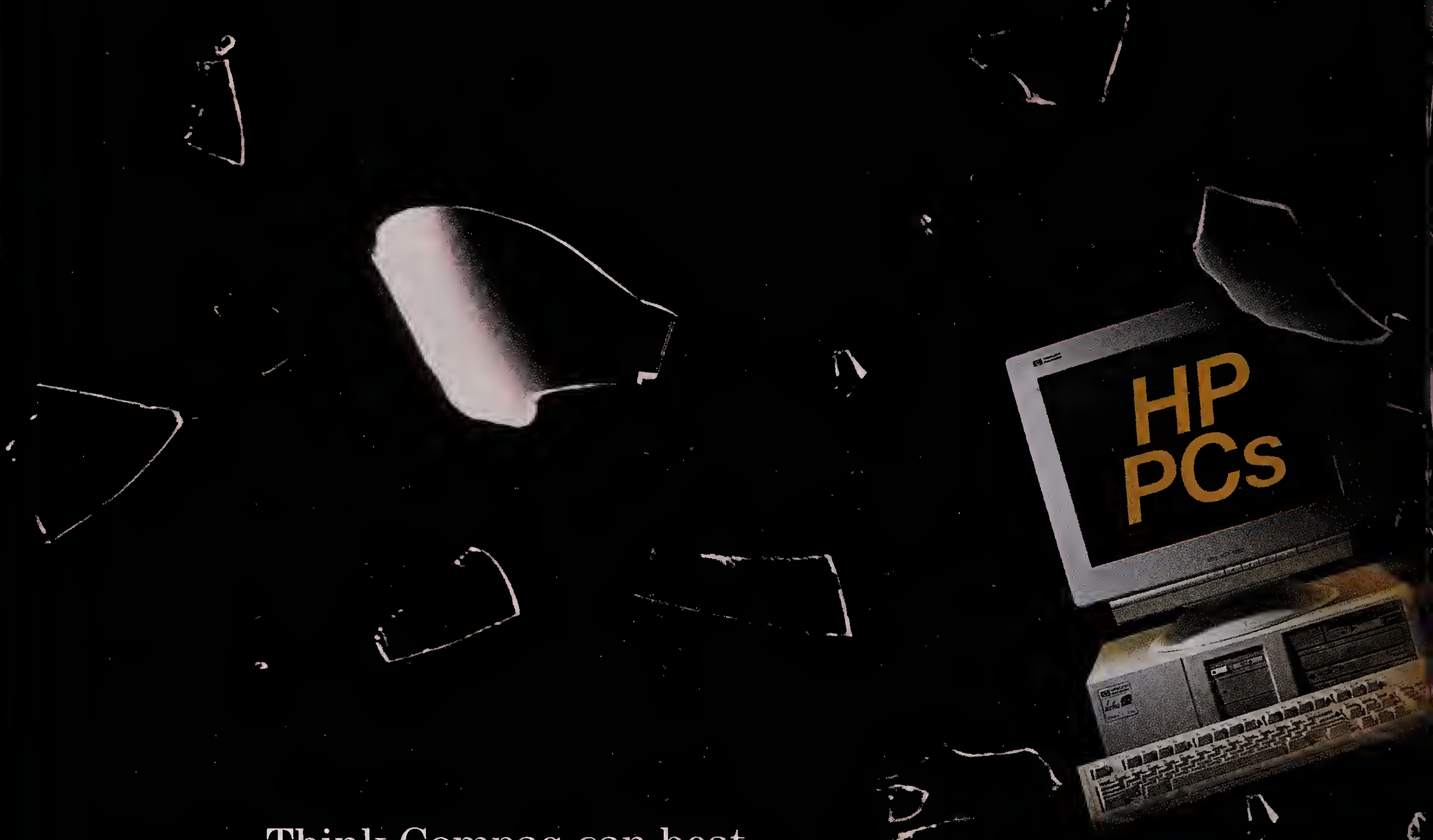

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HP mouse and keyboard. [1]Source 1994 J.D. Power and Associates PC Customer Satisfaction Study.^{SM} Study conducted among business users and based on 1,528 user respondents. MS-DOS is a
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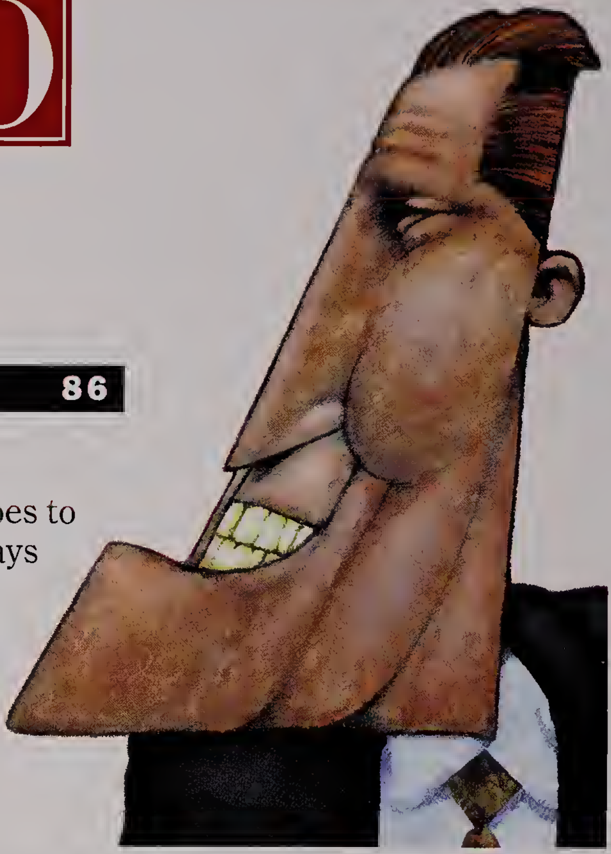
I'm OK, You're Really Weird

Myers-Briggs testing identifies different personality types to encourage teamwork among employees who aren't always inclined to see eye to eye.

By Carol Hildebrand



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INSIGHTS: OWNER'S MANUAL

With proper care and feeding, business processes can be continually improved. Assigning a process owner is the first step.

By Robert M. Curtice

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STATE OF THE ART: HITTING A MOVING TARGET

Faster, easier and more timely data access and analysis. That's just the beginning of why OLAP is such a hot topic these days.

By Alan R. Earls

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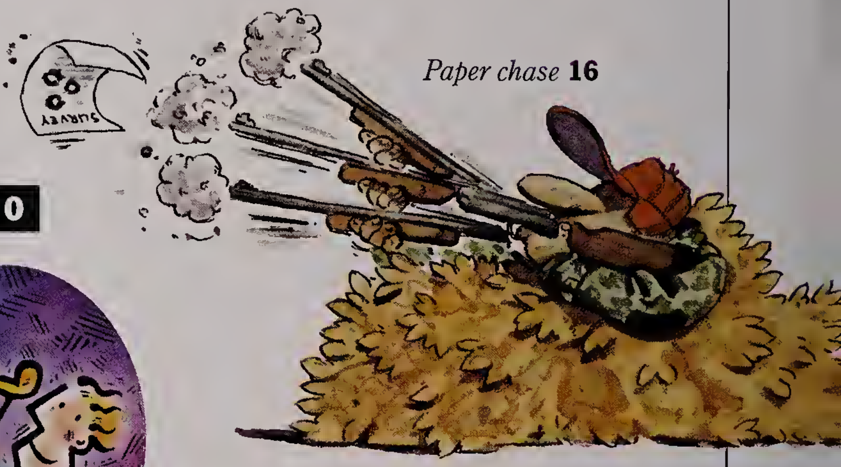
No matter how smart a company's sales strategy, IS still must sell the technology to its toughest customer—the sales department.

By Stephen Mills



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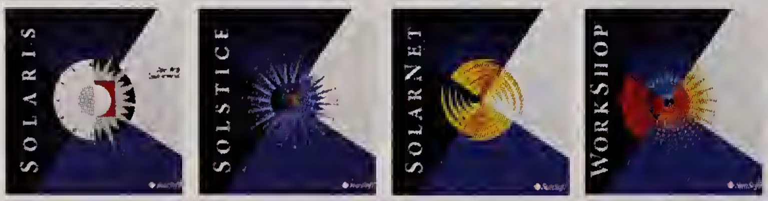

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"Know Thy Customer."

That simple business axiom can sometimes get lost in translation, with disastrous consequences. For instance, an American appliance maker knew its domestic customers preferred irons equipped with automatic shut-off devices. But because customers in Europe *will* buy irons with manual shut-off switches, it took the American manufacturer awhile to persuade its European product designers to make the product to American specifications.

Different corporate cultures, organizational styles and business practices are facts of life for U.S. executives who work for foreign corporations. As Senior Writer Anne Stuart points out in "Long-Distance Relationships," which begins on Page 37, IS executives in foreign-owned corporations have two specific challenges. The first is to provide IT support for U.S. business demands that may be, literally, foreign to the parent corporation's experience. The second is to satisfy business and technology demands from bosses both here and abroad.

Building a collaborative work environment—whether between American workers or their foreign counterparts—requires some interpersonal skills that CIOs may not be accustomed to using. As one consultant remarked: "You need to work on the soft side to get the hard results."

The soft side—the social dynamics of building trust, understanding different personality types and benefiting from differences—is uncomfortable for many IS executives. Team building and learning to work on a team are particularly challenging. In her feature on the psychology of IT, Senior Writer Carol Hildebrand describes how team-building efforts at Hewlett-Packard's North American distribution organization, Corning's technology services group and Armstrong World Industries' IT group are boosting the success of team-led projects. (Please see "I'm OK, You're Really Weird," which starts on Page 86.)

A gleam in the eye of network experts since the mid-1980s, asynchronous transfer mode (ATM) technology has captured the imagination of telecommunications planners. ATM is ideal for a wide range of high-speed traffic on digital networks and has the potential to carry voice, data and video simultaneously. Until quite recently, though, ATM networks were costly and unproven. Now, reports Senior Writer E.B. Baatz, the business case for ATM is growing steadily stronger. (See "The Switch Is On," beginning on Page 46.) Prices have dropped dramatically (by as much as 50 percent a year), while the demand for bandwidth-hungry client/server applications is fueling the market for ATM products.

CIOs charged with planning, building or rebuilding a high-speed communications infrastructure that will satisfy growing business needs into the next century should think seriously about boarding the ATM bandwagon.

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CIO

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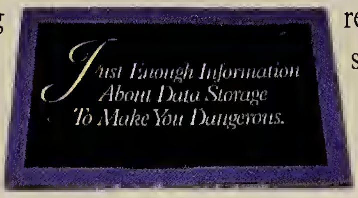

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LETTER FROM THE PUBLISHER

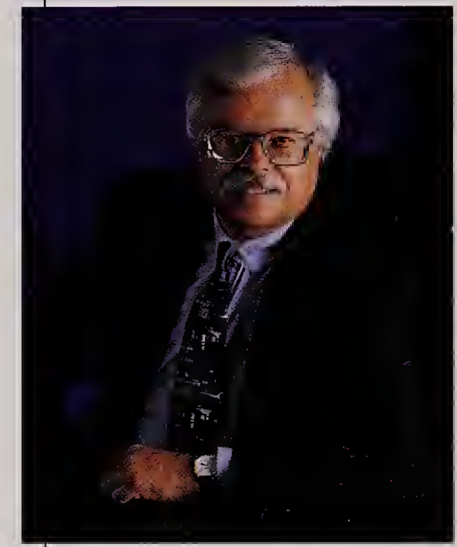


PHOTO BY WEBB CHAPPELL

> *"For anyone who has to get their communications infrastructure set now for growth over the next five to 10 years, the question is not* when *to do ATM. It is simply* how *to do it."*
>
> *–Rick Stevens*
> *Director, Math and Computer*
> *Sciences Division*
> *Argonne National Laboratory*

What does "ATM" mean to you? For the average Joe, the term would, until very recently, call to mind those banking devices that virtually spit money at you and always seem to malfunction when you really need them most.

But in the mid-1990s, ATM means something wholly different from an automatic teller machine—although it may, in the long run, throw some money your way. What I'm referring to is asynchronous transfer mode, a way of designing data packets that is particularly suited to audio and video information as well as text. In a nutshell, ATM can revolutionize networking because of its ability to move information seamlessly at an utterly remarkable speed. Yet because ATM also carries many risks and high costs, few IT executives in the past decade have felt that the uncertain ends justify the means.

Yet, as always, a few courageous forerunners can help turn the tide of the masses. "The Switch Is On," found on Page 46, relates the experiences of those organizations that assumed a position of leadership in the ATM conversion even before this technology began to accrue a positive climate of opinion.

I hope that you will seize on this chance to absorb solutions-oriented information about this most vital of topics.

P.S. We are now taking reservations for the next Perspectives conference, "The Psychology of IT: The CIO's New Mind Set," to be held Oct. 15-18, 1995, at the Hyatt Grand Cypress Resort in Orlando, Fla. To reserve your space, or for more information, please call 800 366-0246 or refer to our Web site—*http://www.cio.com/conferences/perspectiv.html.*

Coming In CIO

Telecom Fever

Is there a role for IS in managing the mergers and alliances in the changing telecommunications industry? *CIO* takes an inside look at the deals that promise to bring a spectrum of leading-edge communications technologies into both homes and businesses.

Satisfying IT Customers

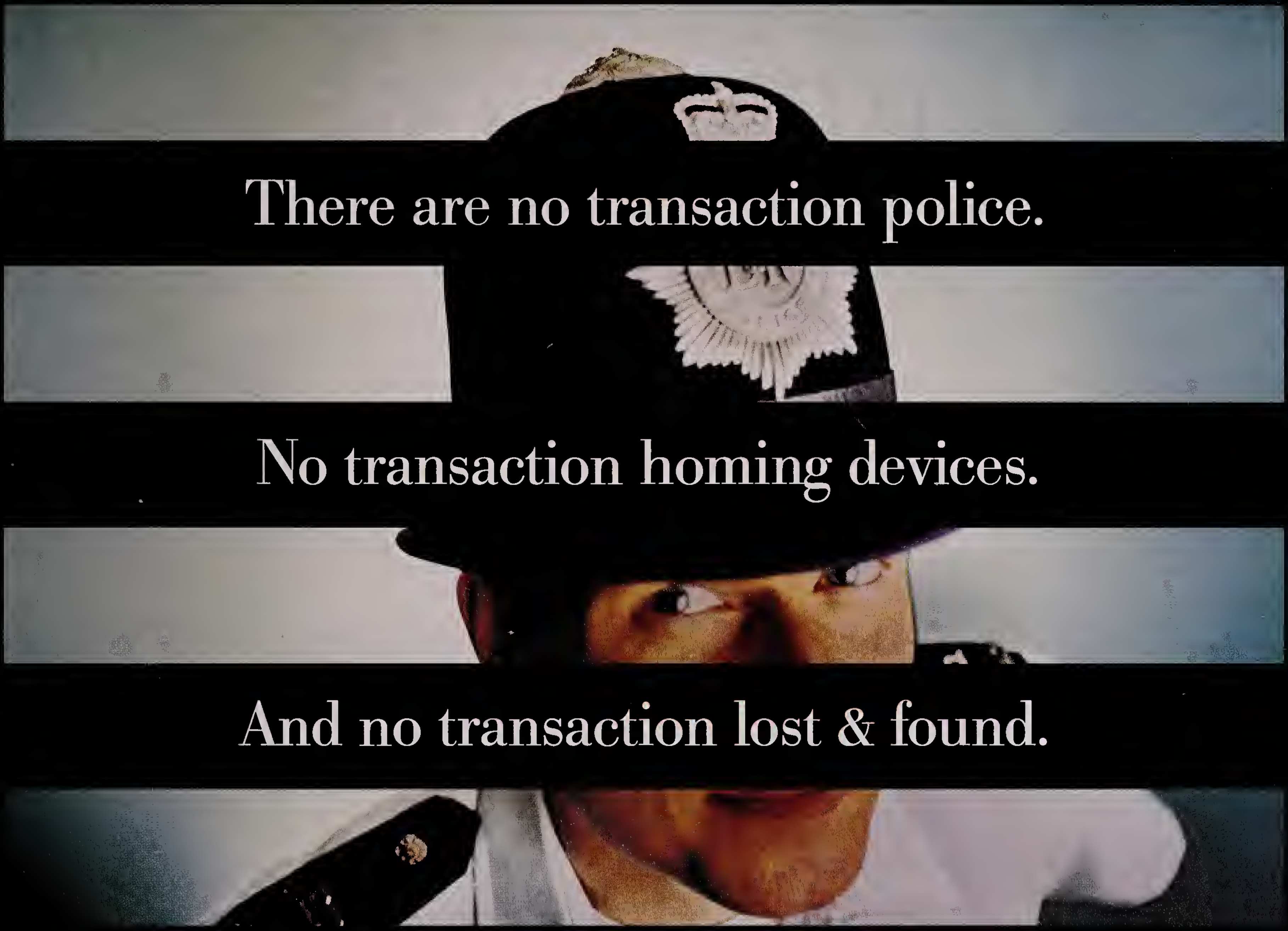
IS groups looking to monitor and measure end-user satisfaction often go beyond the traditional approaches such as employee surveys. Instead of tracking the number of phone calls to an internal help desk, for example, they focus on treating internal end users as they would their external customers.

First Port of Call

The first in a series of European Spotlights, these mini profiles of European companies and their CIOs shed light on some issues common to European businesses and companies that want to play in the global market.

MIS in Vietnam

Many companies are eager to establish a presence in Vietnam's emerging market. But how will IT and telecom issues fare in a big community whose potential is untapped and whose infrastructure is undeveloped?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TRENDLINES

VIRTUAL REALITY

THE CAVEMAN COMETH

Throughout civilization, all the greatest technologies were tested in caves. First fire, then the wheel and now ATM networks. In this case, the cave is a virtual reality theater in which researchers at Argonne National Laboratory in Argonne, Ill., are exploring the science of molecular drug design and discovering new ways of casting aircraft parts in simulated iron foundries. Furthermore, these cavemen (and women) of the 20th century are using sophisticated supercomputers and one of the world's fastest, most advanced communications networks. (See related story, Page 46.)

Argonne's Cave Automatic Virtual Environment (CAVE) is a three-dimensional virtual reality machine that lets scientists literally surround themselves with complex chemical, industrial and medical data. Researchers don stereoscopic glasses and enter the 10-foot square, steel-framed and projection-screen-draped laboratory to interact with their experiments.

A scientist, for example, might use CAVE to enter the core of a simulated nuclear reactor to test new techniques for controlling robots remotely. Another researcher, collaborating with Surface Finishing Inc. of Burbank, Calif., simulates the grinding of a block and wheel to observe how temperature and stress affect material properties. Caterpillar Inc. of Peoria, Ill., is also working with Argonne to study ways to improve metal casting processes.

By using a wand that functions much like a video-game joystick and stereoscopic glasses connected to Argonne's IBM SP2 Powerparallel System, a 16-processor supercomputer, scientists can perform thousands of calculations involved in each step of the simulation in real-time. Massive amounts of imaging data are relayed 10 to 20 times per second from the IBM computer over Network Systems Corp.'s high-performance parallel interface (HPPI) switch to Silicon Graphics Inc.'s Onyx system, which renders the images on the walls of the CAVE.

But the traditional HPPI link hasn't been able to meet the demands of the CAVE system. The problem isn't bandwidth. "The issue for us is one of latency," says Timothy C. Kuhfuss, associate director of Argonne's Electronics and Computing Technologies Division. So in 1994, CAVE workers also installed a Fore Systems Inc. ASX-200 asynchronous transfer mode (ATM) switch to help speed the transfer of data from CAVE to the IBM computer and back again.

Now, Kuhfuss is spearheading an unusual experiment to connect the virtual environments and supercomputers at laboratories around the country via ATM networks. The experiment, dubbed I-WAY–for Information Wide Area Year–is a collaborative effort among hundreds of companies, labs, carriers and ATM equipment vendors. Their goal: to create a national ATM backbone. "Anyone who has an R&D arm has a finger in this," says Kuhfuss.

The year-long wide-area ATM experiment will culminate in a demonstration at the Supercomputing '95 conference in San Diego Dec. 4 to 8, when folks will get to enter Argonne's CAVE, located thousands of miles away. For more information on Supercomputing '95, visit *http://sc95.sdsc.edu* on the Web or call 800 NII-SC95.

–E.B. Baatz

THAT WAS THEN, THIS IS NOW

ATM "is a type of fast packet-switching transmission that will be the basis for most network communications by 1997," predicts Peter G.W. Keen in the updated *Every Manager's Guide to Information Technology* (Harvard Business School Press, 1995). My, how times have changed. In the 1991 edition, the entry for ATM read simply, "See Automated Teller Machine." (See related story, Page 46.)

NOT JUST YOUR TYPE

Understanding personality types can boost productivity on cross-functional teams. (See related story, Page 86.) To find out more, check out these Web sites:

http://www.brad.ac.uk/~mdavarle/personality.html

http://sunsite.unc.edu:80/personality/keirsey.html

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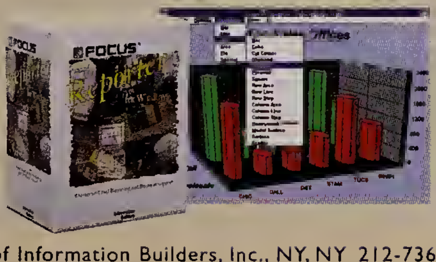

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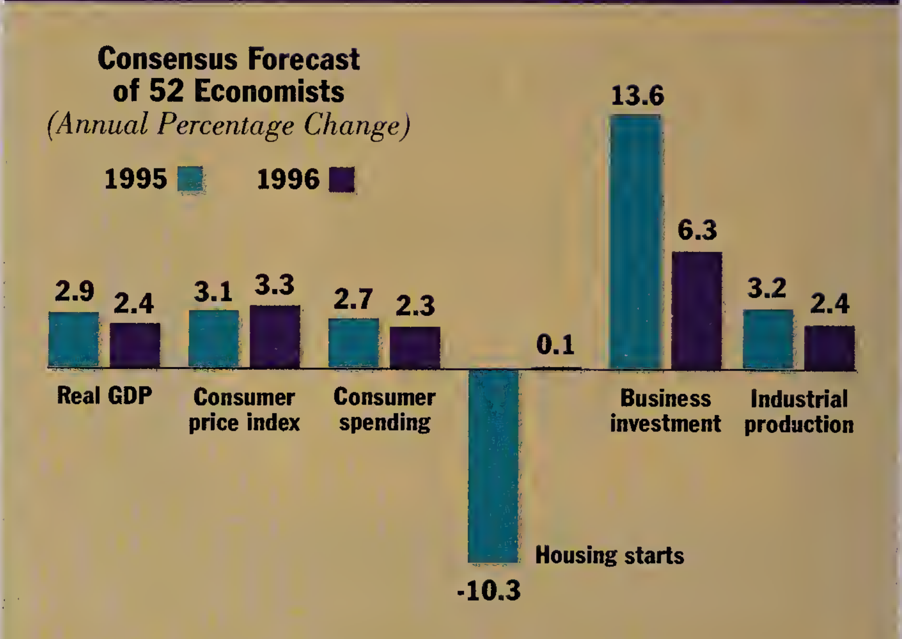
TRENDLINES

ECONOMIC OUTLOOK

WHAT GOES UP…

The Economists' Bets



SOURCE: EGGERT ECONOMIC ENTERPRISES' BLUE CHIP ECONOMIC INDICATORS, AUGUST 1995 REPORT

It's the economy, stupid. So goes the famous refrain from Bill Clinton's 1992 presidential campaign. And it's becoming the theme song in the average CIO's office nowadays, too.

The good ol' days when IS executives could blithely ignore the economic forecasters have gone for good, say senior IS executives interviewed by *CIO* magazine in a recent straw poll. "In today's business climate, every executive, even the information systems executive, must keep a finger on the pulse of the economy," says Dan McNicholl, vice president of information systems for Whirlpool Corp. in Benton Harbor, Mich. "So I keep track of the numbers that the Association of Household Appliance Manufacturers publishes monthly, as well as what the business people at my company are forecasting."

Now, the biggest question mark on the economic horizon is the possibility of a recession. "We have the sneaking suspicion that the chemical industry is at the top of its business cycle," says Robert M. Rubin, vice president of IS for Elf Atochem North America Inc., a $1.6 billion chemical company in Philadelphia. Indeed, according to Blue Chip Economic Indicators, a poll of 52 economists conducted by Eggert Economic Enterprises Inc. of Sedona, Ariz., the gross domestic product (GDP) of the economy is expected to grow 2.4 percent after adjusting for inflation in 1996, on the heels of an expected 2.9 percent gain in 1995. For IS departments, the implications of slower economic growth ahead are many.

Rubin, for example, is delaying purchasing Windows 95 because he doesn't see the economic justification for converting yet to a 32-bit operating environment. A weaker economic forecast simply adds to his reasons to wait on Windows 95, he explains. During the Bush-era recession in 1990-91, Rubin says he froze new hiring in his IS department long before his company decided to implement a freeze. "Reading business publications like *The Wall Street Journal*, *Forbes* and *Fortune* as well as talking with my business partners about the economic outlook meant I was ready," says Rubin.

It's easy to forget what the macro economy might be doing these days, however. "Sales of computers are at their highest level ever, so there is an enormous sense of euphoria in the high-tech industry today," says Paul Strassmann, president of Strassman Inc., a consultancy in New Canaan, Conn., and former CIO for the Department of Defense. But CIOs would be well advised to have their contingency plans ready for slower economic growth. "Operating costs of most IS departments are way up," says Strassmann. "So a recession would have a very serious hit on modernization budgets."

While not many economists in the Blue Chip panel are talking recession, a good handful, including economists from General Motors Corp., Bank of America and Chase Manhattan Bank as well as Eggert himself are calling for overall economic

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SAY IT WITH SILICON

You're pretty sure that red roses mean love. But does sending a dozen yellow long-stems signal a passionate crush or is it just a polite way of avoiding the unpleasant "Look you're nice enough, but let's be friends" conversation? According to a recent article in *The New York Times*, decoding the language of flowers soon will require much less guessing, thanks to Geoffrey Stern, a Manhattan marketing specialist who has developed a way to send a voice message along with a bouquet. The sender dials a toll-free number to record a private message; the florist then downloads the greeting onto a voice chip embedded in a card that's delivered with the flowers. The technology, which was patented by New York's Starbro Communications, lets senders avoid the embarrassment of sharing their innermost feelings with telephone operators. And while flowers fade, the message can be replayed more than 100 times on a single battery—and doesn't need water.

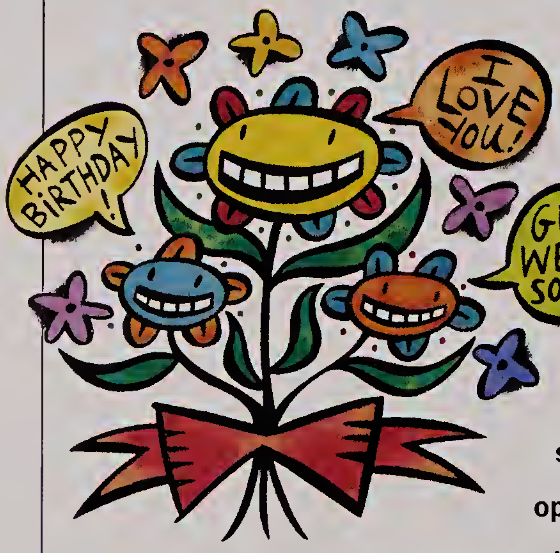
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ILLUSTRATION BY MARY ANNE LLOYD; CHART BY MICHAEL SIGGINS

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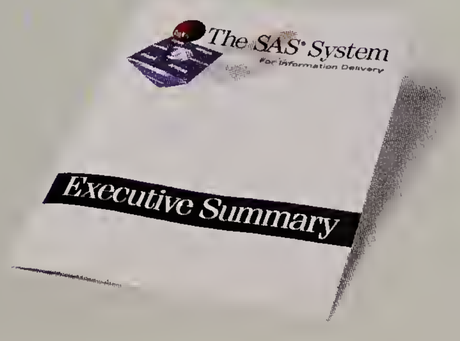

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growth to sink to 2 percent or less next year. "We have to be very conscious of what is going on in our marketplace because these forecasts affect our operations budgets and our recruiting plans," says Peter Daboul, Massachusetts Mutual Life Insurance Co.'s senior vice president of Information Systems Services in Springfield, Mass. And for IS executives, managing down expenses—recession or no—is the name of the game.

For more information about Eggert Economic Enterprises' Blue Chip Economic Indicators report, call 602 282-4882.

–E.B. Baatz

BANISHING MAIL-ROOM DISGRUNTLEMENT

Starting in the mail room these days may be better training than you'd think (just ask Michael Ovitz). Prioritizing and delivering hundreds of packages and express shipments—all arriving in a two- to three-hour window—on top of handling incoming U.S. mail is hardly a stress-free introduction to the corporate world. In fact, Fortune 500 companies spend 4.4 hours each day—more than two months a year—sorting and delivering incoming mail, according to a 1994 Gallup study.

Now that carriers are promising earlier and earlier deliveries and companies are demanding accurate records management, instant tracking and enhanced security, the job of mail clerk is getting even tougher. To help the frazzled mail-room staff, Pitney Bowes Inc. has introduced Arrival, an IBM-compatible hardware/software package that manages and automates the internal routing, tracking and recording of critical mail and express shipments. The company claims that the software not only ensures error-free recording of all incoming mail and packages but also facilitates speedier delivery.

Arrival's hand-held data collectors let delivery personnel scan the package ID and record the recipient's name for each arriving package; later they can scan the recipient's bar-coded ID badge when the package is delivered. Once deliveries are made, the data is uploaded to the system for easy tracking and instant verification. In addition to offering configurable prompts and an online help menu, Arrival lets mail-room staff place an "alert" and special delivery instructions in the system for an expected mail or express shipment. When the package arrives, the system flags it as an urgent delivery.

For more information, call Pitney Bowes in Stamford, Conn., at 203 356-5000. ■

A BIRD IN THE DATABASE IS WORTH TWO IN THE BUSH

Any fisherman worth his salt embellishes upon the account of his catch with each telling. Likewise, the sooner you ask a hunter how many birds he bagged on his last hunt, the more likely you'll get an accurate answer. Although in the past, the U.S. Fish and Wildlife Service had to rely on post-season surveys of hunters, a federal mandate to collect bird hunters' addresses from states within 30 days of license purchase will help the government do a better job of keeping tabs on bird harvest statistics. To meet the demand for greater speed, Tennessee, Maine, Colorado and California plan to employ scanning technology.

ILLUSTRATION BY TRAVIS FOSTER

When the Migratory Bird Harvest Information program begins in Tennessee this March, hunters purchasing licenses will have to fill out a survey card at the point of sale, whether it's a mom-and-pop bait shop or a Wal-Mart. These agents will mail the cards to the Tennessee Wildlife Resources Agency, which in turn must forward the data to the federal government.

Originally, states were to be given just 10 days after a hunter bought a license to furnish the information to the feds. Recognizing that the traditional system of entering hand-printed survey data into a database wouldn't fly, the Tennessee Wildlife Resources Agency decided to automate the process using an Intelligent Forms Processing System (IFPS) from Wheb Systems Inc. of San Diego. "Scanning a document is much faster and more efficient than data entry," says Loy Fulford, director of IS management for the agency. "It was the only way I could halfway hope to comply [with the 10-day requirement]." Though the deadline has since been extended to 30 days, Fulford expects IFPS's character recognition technology will help streamline processing of the 150,000 to 200,000 migratory bird-hunting licenses the agency handles each year.

Edward Warr, a wildlife biologist at the agency, looks forward to collecting better information on populations of migratory birds such as morning doves, woodcocks and snipes—and those who hunt them. "Not a lot of people out there [hunt snipes]," he says. "But we'll be able to ID them with the survey." ■

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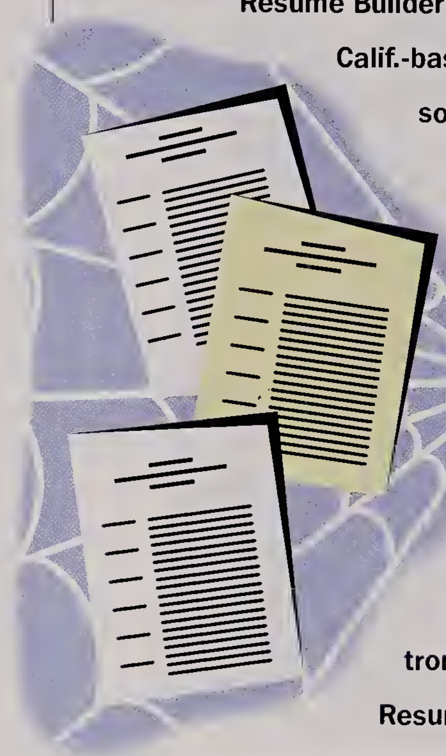
Networking on the Network

In the 1980s, the advent of the PC and laser printer heralded the arrival of a new era in job hunting. No longer did updating your resume entail several excruciating hours of typing ever so carefully on a crotchety Smith Corona. Now a new resume service on the World Wide Web promises to simplify even further the process of selling yourself to prospective employers.



Resume Builder from Resumix Inc., a Santa Clara, Calif.-based provider of HR management software and services, lets job seekers generate resumes online that are optimized for electronic resume processing. Resumes created using the free Resume Builder service may be posted against job openings on the Web site of CareerMosaic, an online job broker, or sent to companies that use Resumix's electronic resume-processing system. The Resumix system, which lets companies electronically scan resumes or receive them directly via Internet e-mail, extracts relevant qualification information and automatically matches qualified candidates to open positions. Resume Builder helps users format their resumes to be more easily "read" electronically and helps maximize the number of matches between job requirements and a candidate's skills, education and work experience.

"Conventional paper resumes challenge job seekers to consolidate qualifications to one or two pages," says Resumix President and CEO Stephen Ciesinski. "Resume scanning and processing systems place no limitation on the amount of detail in a resume, so candidates may present a much more complete picture of their skills and abilities."

Those who would be employed can access Resume Builder through the Resumix Web site (*http://www.resumix.com/*). Job seekers may print hard copies of the resumes they construct or save them as electronic text files. The Web site also offers hints on preparing effective resumes for electronic scanning and processing systems.

EVENTS

Power '95: The Third International Conference on Power Requirements for Mobile Computing and Wireless Communications

Oct. 16-18
Santa Clara Westin Hotel & Convention Center, Santa Clara, Calif.
BIS Strategic Decisions and Arthur D. Little Inc.
800 874-9980

The conference will focus on technical and marketing issues surrounding power requirements for portable computing and wireless communications. Management techniques as they relate to PCMCIA, displays, storage systems and Windows 95 will also be discussed. Other sessions include market dynamics; end-user requirements; and environmental, regulatory and safety considerations. Registration: $895

Business-to-Business Marketing on the Internet

Oct. 18 & 19
Hyatt Regency Chicago
International Quality & Productivity Center, Marketing Advisory Council
800 882-8684

Representatives from top American corporations will present case studies of their companies' winning strategies for marketing on the Internet
Registration: $1,195

Enterprise Management Summit '95

Oct. 23-27
Dallas InfoMart, Dallas
Action Motivation Inc.
800 340-2111

This conference and exhibition covers asset management, software distribution and configuration, help desks, distributed applications and databases, networks, security and the Internet. For an additional fee, participants can also register for intensive full- or half-day tutorials on individual topics. Registration: $295-$795

Systems Support Expo

Oct. 25-27
Moscone Convention Center, San Francisco
Service News/United Publications Inc.
207 846-0600

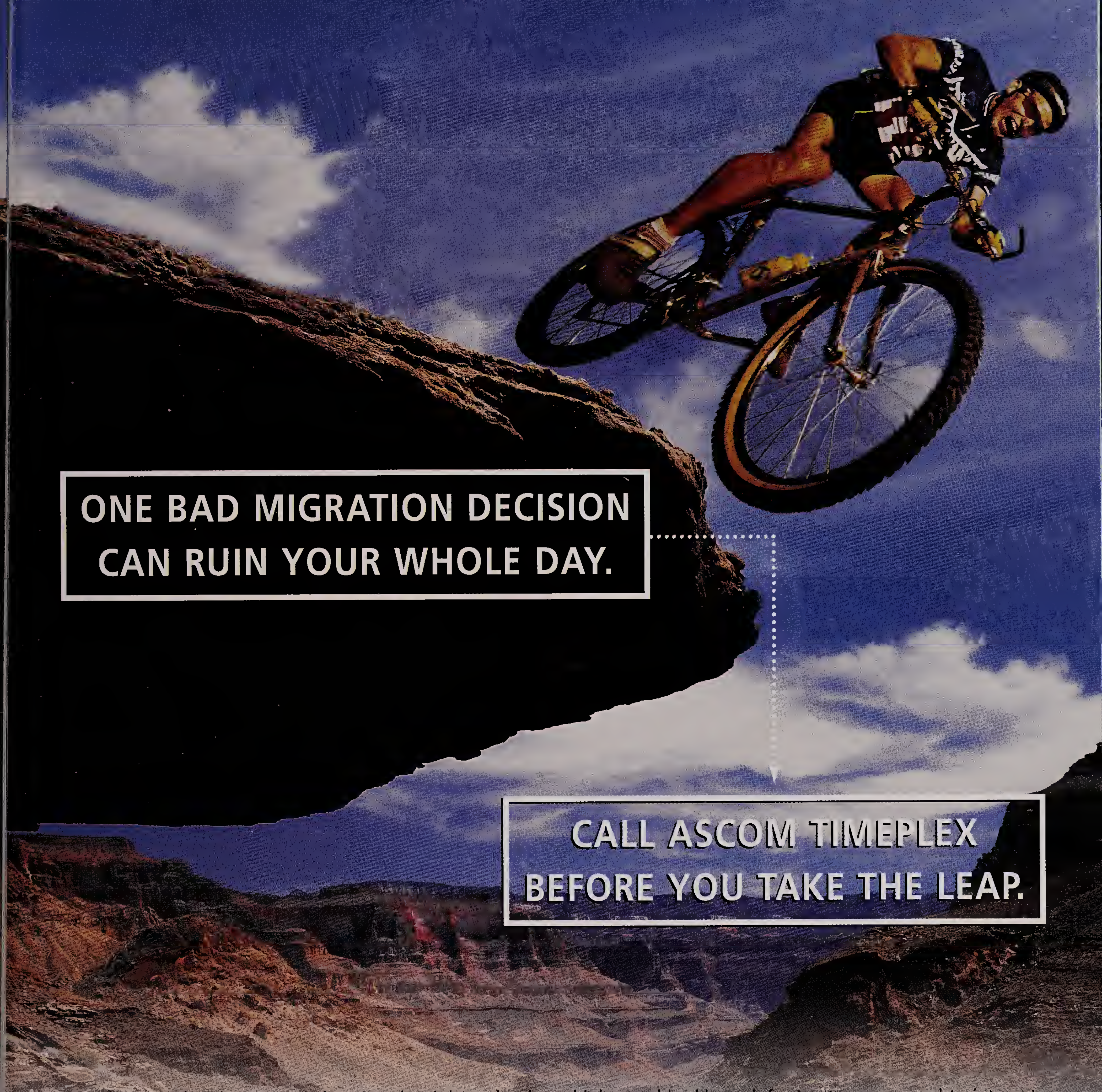
This event offers support solutions and professional services for network support, help desk and hardware maintenance professionals. Included are both internal and external support strategies. Registration: $395-$595

Managing the Privacy Revolution '95

Oct. 31 & Nov. 1
Hyatt Regency Hotel on Capitol Hill, Washington
Privacy & American Business/Center for Social and Legal Research
201 996-1154

Nationally recognized experts from the legal community, business, government, and public interest and privacy-advocacy groups will address the issues surrounding businesses' use of personal information. Plenary session presentations and panel discussions continue in breakout groups that target specific industries, including telecommunications and interactive and online services. Registration: $695

ILLUSTRATION BY MICHAEL SIGGINS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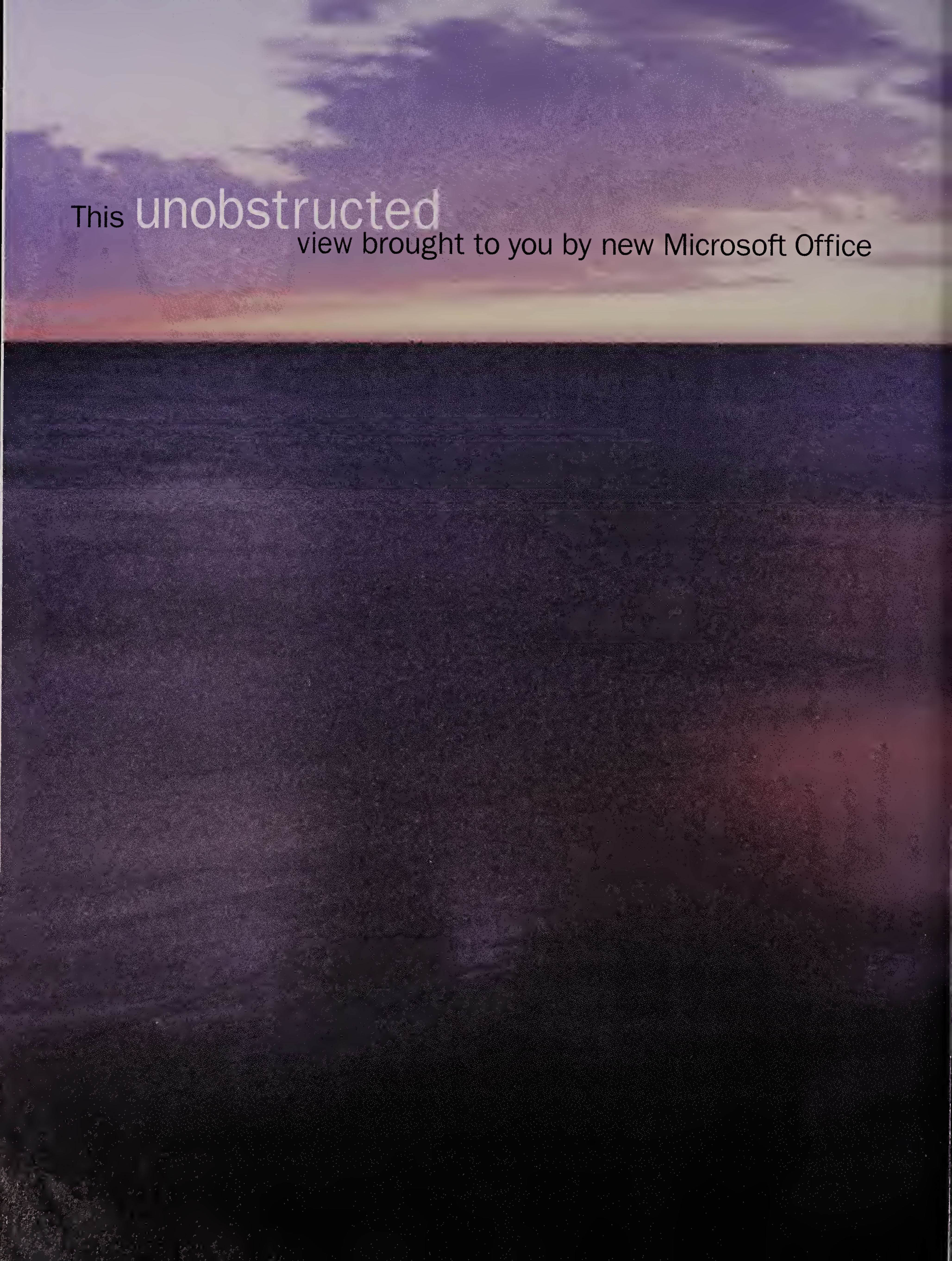
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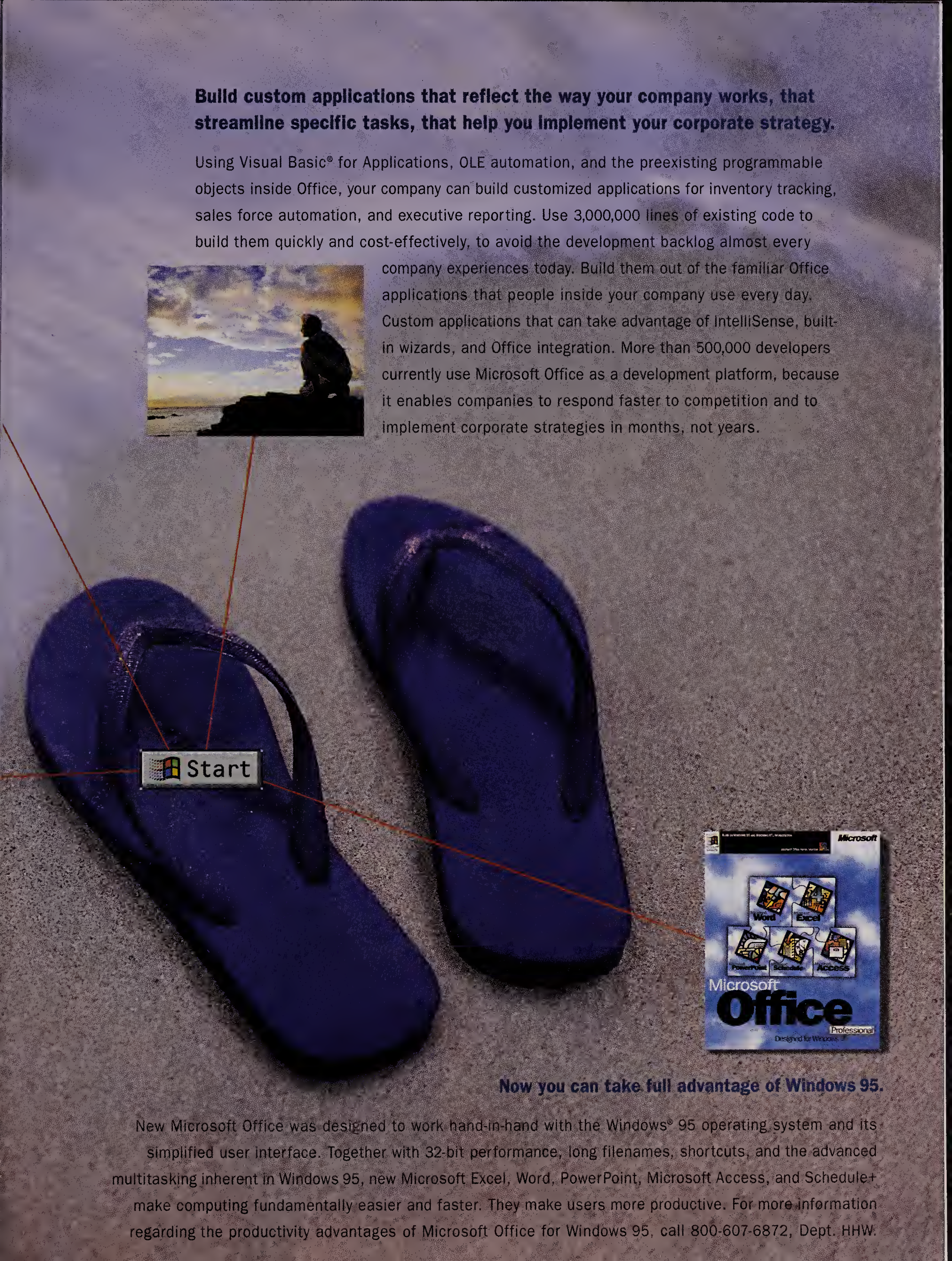

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Owner's Manual

With proper care and feeding, business processes can be continually improved. Assigning a process owner is the first step.

BY ROBERT M. CURTICE

For all the attention paid to business-process redesign and the travails of implementation, there has been little focus on what takes place after redesign—a company's steady state. Business-process redesign is not a one-time event. Even if the CEO drives for a major overhaul and "reinventing" of the entire business, it is likely to span many years, even if all goes well. Process-oriented improvement is, if you think about it, a never-ending process in itself.

To institutionalize ongoing process improvement, organizations must establish techniques and standards for future reengineering programs. In essence, they must capture what they've learned about how to implement business-process redesigns successfully, how to deal with cultural, political and other barriers to change, and how to increase their ability to leverage learning quickly and effectively.

Most companies today are organized by function within line of business and geography, with either formal or informal functional ties across units and geography—a matrix. Daunted by the uncertainty and risk of structuring the organization by processes, most companies opt to retain a more traditional structure. Nevertheless, thoughtful managers now understand the need to embrace a process orientation. Defining and understanding cross-functional workflows, formation of empowered work teams and even co-locating workers involved in the same process all help to emphasize the process view. Another step, short of reorganizing the company by process top to bottom, is to establish the process owner.

ILLUSTRATION BY DAVID TILLINGHAST

Role of the Process Owner

The process owner takes an enterprisewide view of a broad cross-functional process. He or she doesn't "own" the process in an organizational sense, in that many of the people who are involved in carrying out the process do not report directly or indirectly to the owner. Instead, the owner is responsible for the design of the process: how it is carried out, how it interacts with other processes and how it is measured. And this responsibility is an ongoing task.

Although many companies identify a single executive as the sponsor or manager in charge of process redesign (perhaps in addition to a steering committee), few recognize the need—and opportunity—to designate a process owner with *continuing* responsibility. Appointing a senior manager as process owner can provide ongoing visibility to the process view; it also underscores the need to improve and measure the process continually without the upheaval associated with dramatic organizational change.

The process owner's responsibilities are sixfold:

1. Understand the Process. The process owner's first job is to develop and maintain an enterprisewide

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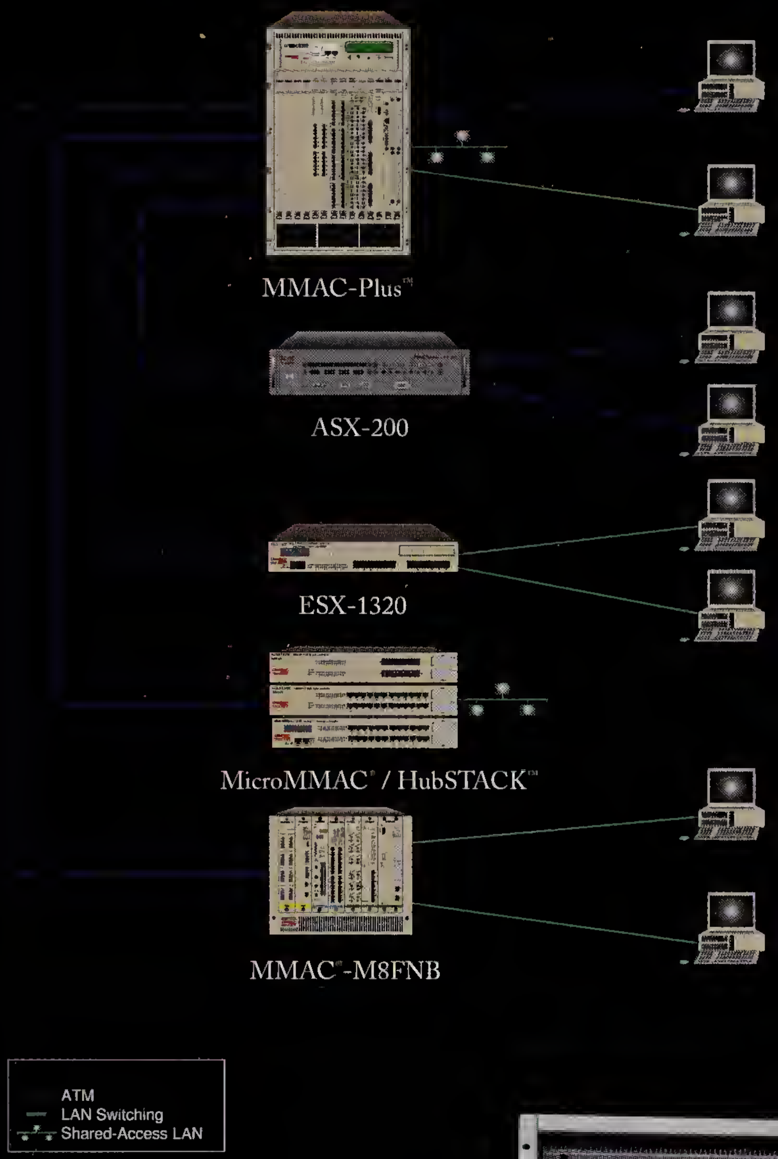

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understanding of how the process is currently carried out—in practice, not in theory. This is a fundamental task in any major redesign project. But even after a new process is designed, the implemented process won't follow the design exactly; local variations will arise, and as time passes, other variations will creep in. Accommodations must be made as other interrelated processes themselves change. These modifications may or may not be for the better. Either way, the process owner must know about them *and* possess a comprehensive understanding of the entire process and its interrelationships with other processes across the company at all times.

2. Target the Process. A cross-functional business process must support the overall strategy and objectives of the enterprise. The process owner, therefore, needs to understand how the process fits into this broader vision. For example, perhaps the process has a major impact on time to deliver, and a key element of the business strategy depends on shortening that time frame. In addition, the process owner must identify the internal and external stakeholders of the process and ascertain how well the process is meeting their expectations. Understanding which targets—such as delivery time of less than 24 hours—are appropriate in the long run for the process is also essential.

3. Measure the Process. The process owner must know what and how to measure on a continual basis. These metrics may involve in-process measures as well as end-result measures. They may be directly observable (for example, percent scrap) or somewhat subjective (such as an employee survey). Continual measuring should enable the process owner to track both the efficiency and effectiveness of the process over time.

4. Benchmark the Process. Benchmarking the performance of another organization can motivate others to change or suggest feasibility ("What do you mean we can't ship orders in 24 hours? Acme does it in 18 hours!"). But the greatest benefit is derived from benchmarking not the results, but the process another firm uses. Because a firm in another industry often provides the greatest insight, the process owner should watch for firms that excel at this process.

5. Envision the Process. Building on an understanding of the current process and its targets, measures and benchmarks, the process owner should develop a longer-term vision for the process and the steps to reach it.

Daunted by the uncertainty and risk of structuring the organization by processes, most companies opt to retain a more traditional structure. Yet, thoughtful managers now understand the need to embrace a process orientation.

In articulating this vision, the process owner must be explicit about whether each major element of the process should be local, common or global. A local element is one that is carried out in different ways at various geographic locations or in different organizational units (perhaps due to local legal restrictions or different market requirements). A common element would be done at various geographic locations or in different organizational units but in a single, common, "best practice" manner. A global element would be carried out once for the entire enterprise.

6. Report the Process. The process owner should present a yearly "state-of-the-process" report to senior management. The report must conclude with specific recommendations and targets for improvements. It can also raise issues of interprocess coordination or process-function conflict.

Process improvement might require large investments, such as a new information system or a reorganization of the factory-floor layout. The senior management team can evaluate and set priorities for all such proposals at the "state-of-the-process" meeting. In fact, such investments often do not result in benefits *unless* process improvements are carried out concurrently.

7. Improve the Process. By understanding, targeting, measuring, benchmarking, envisioning and reporting the process, its owner begins to have the tools to improve the process continually. Improvement may come in the form of incremental changes or, when called for, major reengineering efforts. In either case, the process owner must ensure appropriate coordination of improvement efforts with other business processes and their owners. We have seen in more than one instance process owners who have focused so intently on their process—to the exclusion of other processes—that they essentially replaced functional and organizational silos with process silos.

Making It Work

Making process ownership work will challenge most organizations. Openness and trust at the top are a must; process owners are encouraged to stick their noses into areas that do not formally report to them. Increased attention to process can upset the balance of power and highlight problems that have been overlooked. Management should, therefore, assign process ownership to an existing senior line manager who is directly responsible for a large part of the process in question. This will ensure that the process will be driven from a broad business vision—and that process improvement will be implemented. To get the maximum benefit of process ownership, senior managers have to take on this responsibility themselves. CIO

Robert M. Curtice is a vice president and director in the management consulting division at Arthur D. Little Inc. in Cambridge, Mass.

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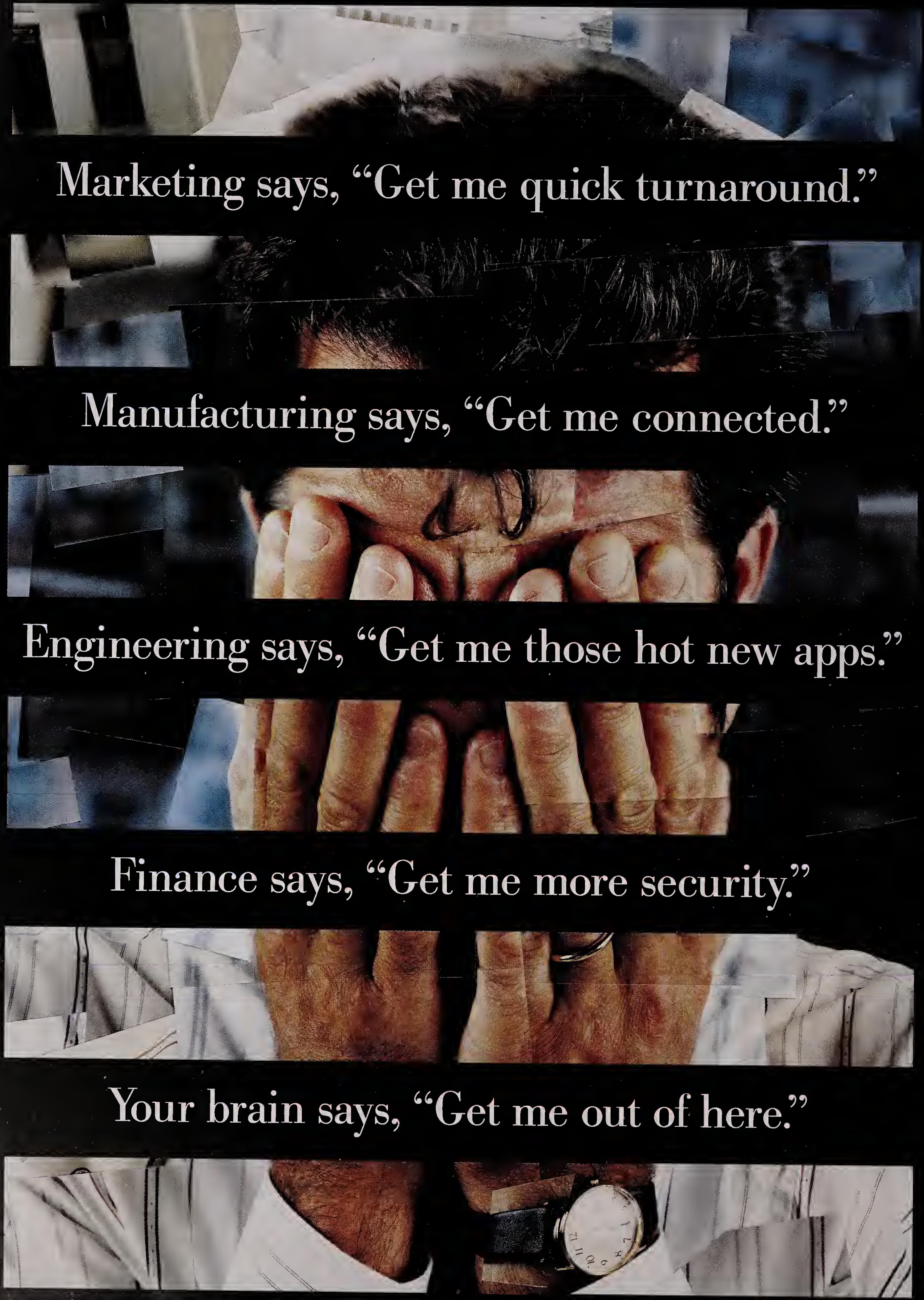
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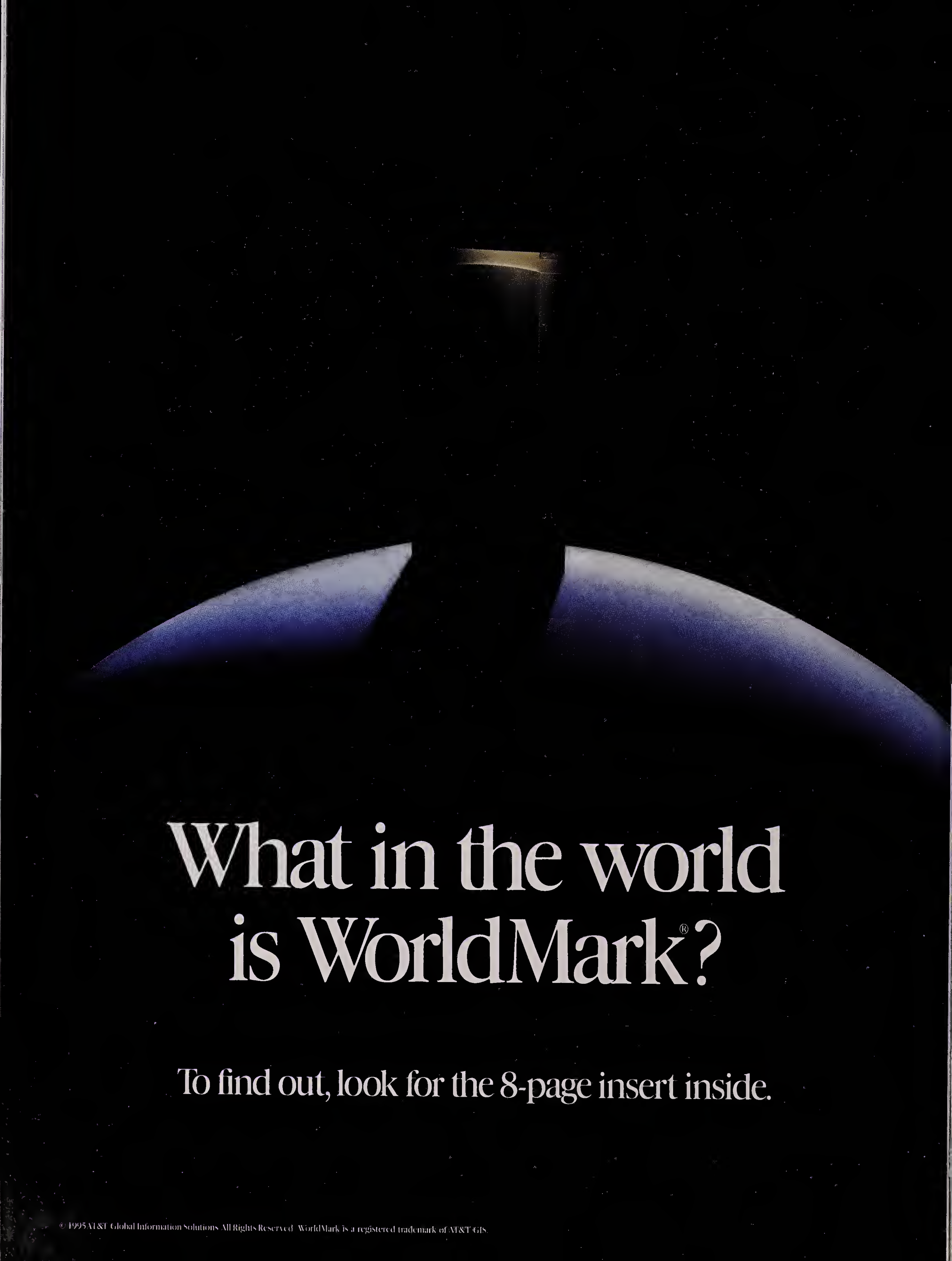
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Long-Distance Relationships

Foreign companies with U.S. offshoots may try to remake their American workforces in the parents' image. But while some American workers welcome these changes, the resulting clash of cultures can leave others frustrated and confused.

BY ANNE STUART

THE GLOBAL ENTERPRISE

NORELCO CONSUMER PRODUCTS Co., a Stamford, Conn.-based division of Dutch-owned Philips Electronics, knew its U.S. consumers preferred irons equipped with automatic shutoff switches. But because customers in many other countries readily buy irons without that safety feature, it took the manufacturer's executives awhile to convince European product designers to create models tailored to American tastes.

Ikea Sweden, a Scandinavian home-furnishings retailer, made English its official corporate language worldwide. But even in the company's U.S. stores, products retain their Swedish names, spelled with Swedish characters. That creates chronic headaches for IS staffers at Ikea's North American headquarters in Plymouth Meeting, Pa., who must modify all new keyboards and fonts to type the Swedish alphabet.

Those are just two examples of the challenges facing U.S. executives employed by foreign corporate masters accustomed to different markets, cultures, work styles, organizational structures and business practices. They're problems no one could have predicted a few decades ago, when the United States seemed destined to dominate foreign markets by the end of the century.

ILLUSTRATIONS BY ROBIN JAREAUX

By the mid-1960s, in fact, American firms were doing so much foreign investing that French author J.J. Servan-Schreiber warned in his bestselling book, *The American Challenge*, that within 15 years, “it is quite possible the world's third-largest industrial power, just after the United States and Russia, will not be Europe but American industry in Europe.”

But by the late 1980s, that trend had reversed. Now, as foreign companies increasingly acquire or merge with American firms or open U.S. subsidiaries and divisions, challenges for American managers are multiplying. The growth places new pressure on IS and other executives, who must satisfy business and technology demands from their bosses both here and abroad.

At a Toyota manufacturing plant in Georgetown, Ky., not one of the 6,000 employees has a private office, not even the president.

For many Americans in foreign-owned firms, the biggest initial challenge may be adapting to an alien management style. That calls for adjustment at the most basic level: thinking.

For instance, in Europe, broadly speaking, “there's a tendency to substitute thought for action, while we [Americans] have a tendency to substitute action for thought,” says Kerry Ruhl, IS director for Ikea North America Services Inc. Also, like many other Swedish businesses, Ikea turns on decision by consensus. “They're very much into subordinating the individual to the group,” Ruhl says of his Swedish superiors. “It's more important that the group come up with the course of action.” As a result, American Ikea executives must learn to take a more measured, thoughtful approach and to collaborate from the start.

At American Skandia Life Insurance Corp., another firm of Swedish parentage, Americans must adjust to valuing empowered teams over individual positions. In fact, the insurance giant's managers use titles on their business cards only if they deal regularly with outside businesses, according to executives at Skandia's U.S. headquarters in Shelton, Conn.

Americans working in Japanese companies must similarly adjust to a vastly different corporate culture, beginning with a utilitarian, egalitarian workspace. At Toyota Motor Manufacturing Inc.'s plant in Georgetown, Ky., not one of the 6,000 employees has a private office, “not even the president,” says Roy Vasher, the facility's general manager for IS. Like everyone else, the top executive works from a desk in a large open room and, Vasher says, can be approached without running a gauntlet of assistants.

For that reason, Toyota's Georgetown facility doesn't automatically provide e-mail access to everyone in the company. “Why do you need e-mail to send a message across the room?” Vasher asks.

“That's a culture shock for people coming in, but after you're here a few months, you realize there are a lot of pluses. It opens up a lot of communication lines. And as a manager, you have a better sense of what's going on.” If Vasher sees a group of employees huddled around someone's terminal or desk, for example, that may be cause for concern—a cue he might miss if the same workers gathered in cubes or offices. In contrast to the typical American corporation, Toyota expects its executives to serve less as administrators and more as problem-solving working managers. "You're expected to know the processes in your department and provide direction," Vasher says.

And the Japanese company protects its own in ways American employers don't. For instance, when Toyota's Kentucky plant shuts down for two weeks of retooling, Vasher says, line workers get temporary reassignments to other positions. Typically, American automakers would simply idle the workers.

The loyalty-rewarding approach extends beyond the automaker's payroll. If, for instance, a regular supplier suddenly starts providing sloppy service, Kentucky plant officials take the Japanese approach of trying to help the vendor meet Toyota's expectations. As Vasher puts it: "There's a real effort to work things out and exhaust all chances before going to someone else."

In some cases, business practices in the parent company's home country may seem backward by U.S. standards, and that can prove frustrating for American executives.

While the Toyota example probably sounds progressive to most, in other cases, business practices in the parent company's home country may seem backward by U.S. standards. That can prove frustrating for American executives. For example, U.S. business processes in general have evolved beyond those in Europe and Israel, according to veteran software executive Phyllis Kepnes, who now heads Relational Technology Systems Inc., based in Waltham, Mass.

"Some of the processes [in Israel] are reminiscent for me of the way things were

My Owner Lies Over the Ocean

• •

Companies with distant parents can't afford to let the conversation lag

No matter which side of the ocean you're on, the key to adapting to foreign ownership, according to those who have been there, is keeping the lines of communication open. "We do a lot of traveling back and forth, a lot of telephoning, a lot of faxing," says Phyllis Kepnes, president and CEO of Relational Technology Systems Inc. of Waltham, Mass., a software developer and subsidiary of a Jerusalem-based company.

At a previous job, Kepnes managed two workgroups at opposite ends of the United States, keeping everyone in touch by telephone and with face-to-face meetings every six months. "That was enough to keep everyone feeling benevolent toward the group on the other coast," she says. "But dealing with a foreign group, you need to work a lot harder to keep everyone feeling benevolent toward each other."

Executives at Philips Electronics, based in the Netherlands, took their efforts a step further. Under the company's "expatriates program," a few hundred employees worldwide spend six years in three foreign countries—two years in each location—working side by side with local employees of other Philips facilities. By investing such a significant amount of time, workers truly understand not only how to work in a foreign culture but also how to live in one.

In addition, many companies establish worldwide IT management groups that meet in person, by conference call or videoconference to discuss common concerns. Swedish home-furnishings company Ikea Sweden established a global IT Steering Board made up of seven far-flung IT managers who set technical standards for the company's operations around the world.

The group functions in lieu of a single worldwide IT director, says Kerry Ruhl, IS director for Ikea North America in Plymouth Meeting, Pa., who describes his role as "one-seventh of the CIO of Ikea."

Unlike organizations that emphasize uniform global standards, Ikea's executive IT group strives for worldwide consistency without conformity. "We have not gone overboard with standards, because there's a desire to let the different IT units and business units have local autonomy in decision making," Ruhl says.

At Stockholm-based Skandia Insurance Co. Ltd., IT representatives from four countries joined forces to create a new company that will sell variable annuity policies. The policies were developed first in Spain and then in the United States and Colombia; they are being administered in Mexico and controlled financially from the United States. Working together on one project for the larger company was an unusual experience for the executives, who were more used to looking out for their own regional fiefdoms.

–A. Stuart

here 10 years ago," Kepnes says. For example, she explains, "I have a clear [distinction] in my mind between sales and marketing. That's not always so clearly defined in a small country like Israel, where they haven't come to grips with the idea that different skills are needed for each."

While there's no corresponding gap in technology, she says, Israeli IS departments are structurally different from their American counterparts in two ways: Even managers write code, and staffs remain highly stable for years, thanks to near-zero turnover rates.

Some differences may be blessings in disguise. When Kepnes became president and CEO of the company, she worried a little about meshing with the Sunday-through-Thursday work week at the software developer's parent company in Israel. But now Kepnes views the difference as an advantage; the Jerusalem office can handle business on Sunday so it's waiting for her when she arrives at her office on Monday.

Then there are aspects of corporate culture that foreign owners don't even try to transplant to the American workplace or that simply fail to take hold there. Japanese executives, for instance, are known for working well into the evening, then continuing business over dinner, in contrast to Americans, who tend to head home at 5 or 6 p.m. At Toyota's Georgetown plant, which opened eight years ago, "there was a trend toward [the longer Japanese workday] in the first year or so," recalls Vasher. "But that really isn't the case anymore."

In Sweden, Ruhl says, even salaried employees punch a time clock. In Pennsylvania, Ikea's IS staff works on a flex-time schedule instead: After the first year, the company's U.S. employees get three weeks' paid vacation annually, more than most Americans expect until they've been on the job for years. But, as elsewhere in Europe, Swedish employees get four weeks or more. Many European companies simply close up shop for a month each summer, frustrating their American divisions. "They shut down entire operations for August, which is our busy time [preparing] for the Christmas season," James Benton, MIS director for Philips Electronics North America Corp., says of one factory run by the parent company in the Netherlands.

"Pay scales are a lot lower in Europe. A senior programmer gets much less money in the Netherlands than in the United States."

–James Benton

But even if they get more vacation, "pay scales are a lot lower in Europe," Benton adds. "A senior programmer gets much less money" in the Netherlands than in the United States. Such discrepancies aren't uncommon in foreign-owned companies because, primarily for legal and financial reasons, benefits and compensation conform to local standards.

Some global companies choose to sidestep such "our way-your way" conflicts entirely by establishing a single corporate culture worldwide. ABB Asea Brown Boveri Ltd., which manufactures equipment for power generation, transmission and distribution, among other things, was formed in 1988

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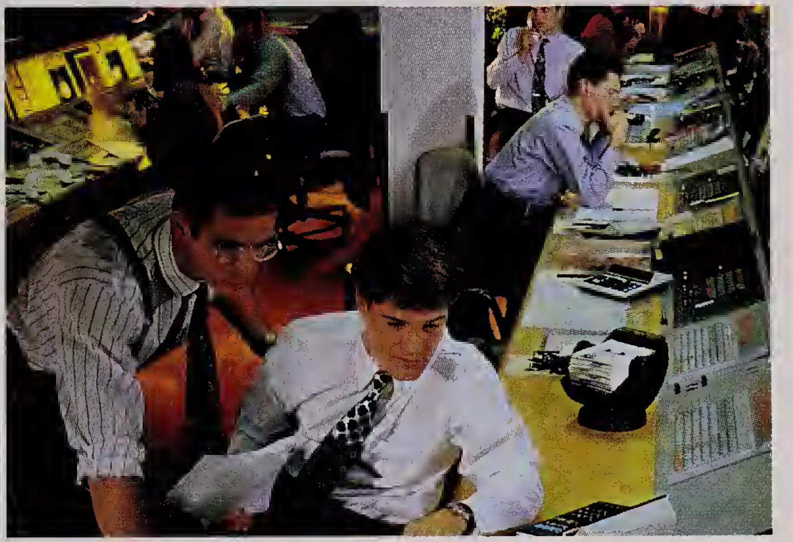

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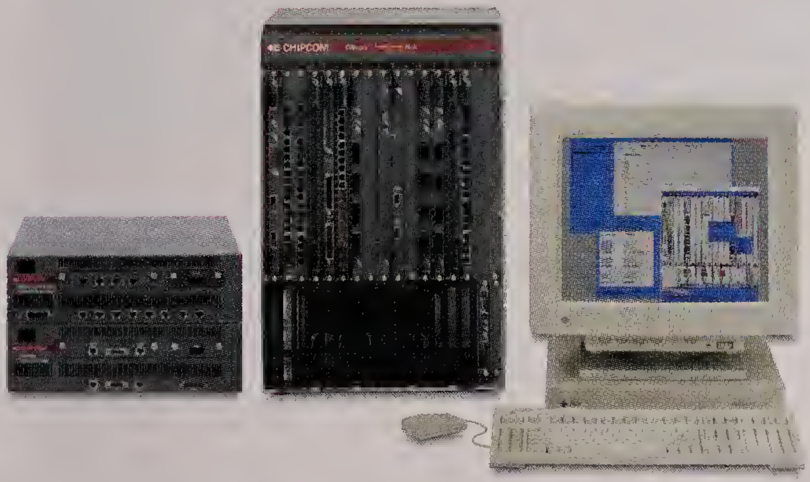

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by the joining of two century-old European firms, Asea of Sweden and Brown Boveri of Switzerland. For the past seven years, the new company has been acquiring small companies or corporate divisions in the United States, the former Soviet Union, Eastern Europe and the Asia-Pacific region. Recognizing the breadth of their new empire, ABB executives set a high priority on creating a single global corporate environment, based on a common understanding of the company's values, goals and business practices.

"What we are trying to do is get them into an ABB culture," says Bo-Goran Persson, president of ABB Power Transformers Management GmbH in Mannheim. ABB believes its training is so uniform that managers in Brazil could pass along what they've learned to employees at a newly acquired ABB facility in Vietnam.

The creation of such one-style-fits-all cultures is increasingly aided by the move to standards of all kinds. For example, while language differences might seem to pose the greatest challenge to corporate coherence, in reality, that barrier stands only a few inches high. In many European countries, and often in Japan, executives speak fluent English and expect to transact business with Americans in that language. In fact, many Western European companies, including Ikea and Philips, have designated English the official corporate language for correspondence and meetings.

At Indigo NV, a digital printing company founded in 1977 in Israel and currently headquartered in Maastricht, the Netherlands, technology itself is the common language. As a startup, Indigo had the luxury of a clean slate, allowing IS managers to select programs that would grow worldwide with the company, says Robert Conrads, CFO of Indigo and chairman and CEO of the company's Woburn, Mass.-based U.S. division. No matter where they work or whether they use Macintoshes or PCs, Indigo employees use Lotus Development Corp.'s cc:Mail and Microsoft's Word and Excel programs. "It's a lot easier to develop one application one time and use it around the world," Conrads says. "It's a lot more effective use of human, as well as computing, resources."

While language differences might seem to pose the greatest challenge, in reality the language barrier stands only a few inches high.

But Indigo's experience is far from universal. Some companies prefer not to impose technical standards on their foreign units, believing that the best solutions will germinate in those organizations' home ground. (See related story, Page 39.) Left to their own devices, IS executives in foreign-owned companies say the biggest challenge for their organizations is providing the proper technical support for American business demands that may be alien to the foreign parent's experience. For instance, Ikea had to redesign its cash-register receipts for its U.S. stores, which do not charge the hefty value-added tax (VAT) standard used in many European countries.

"We also had to set up different point-of-sale systems for the United States and Europe because Americans buy on cred-

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Money Can't Buy You Love

When offshore firms acquire U.S. companies, they may find themselves rejected as a foreign body

Having the boss thousands of miles away provides plenty of challenges for American executives hired for new U.S. divisions of foreign-owned firms. But when a Japanese or a Dutch or even a Canadian company suddenly takes over an American organization, the transition may be even more difficult and painful.

In 1991, Lamalie Amrop International, an executive-search firm headquartered in Tampa, Fla., surveyed 242 senior executives working for 100 large American firms acquired by foreign owners. Overall, the respondents said, the influence of overseas ownership improved their companies' finances, technologies and ability to compete globally, and they praised working with foreign executives as stimulating and educational.

But a majority of the same managers told researchers they didn't understand what drives their foreign counterparts, and they believed their new corporate owners were equally mystified about American motivations.

Researchers concluded that when foreign companies acquired American outfits, the typical U.S. executive team's relationship with the new regime moved from resistance into a brief honeymoon into a period of resentment. Sometimes the situation settled down after some of the most disgruntled executives left.

In other cases, though, Americans were still adjusting years later. "What we found was that there were certain sets of foreign ownerships where relationships just didn't improve. People just came and went, and it was always the same issues," says Lamalie Chairman John F. Johnson, who oversaw the study.

Interestingly, Lamalie's survey indicates that the transition for American executives working for native English speakers in Canadian or British companies was just as bumpy as for those in companies where the boss's first language was German or Japanese. American executives can ease takeover pains by becoming educated about the culture of both the foreign company and its home country, Johnson says.

Bringing in an expert on cross-cultural relations can also help executives from both sides understand each other better, says Hiroki Kato who frequently serves as just such a consultant to Japanese and American organizations as vice president for Japan Business Development at Iomega Corp.'s Palo Alto, Calif., office. But companies should limit the effort to the truly qualified: those who have lived and worked in both cultures.

And, above all, he warns: "Avoid stereotypes."

–A. Stuart

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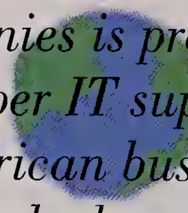
it, while Europeans tend to have fat wallets," Ruhl says. "American stores take all credit cards, including their own private-label charge, and they're beginning to explore debit cards. Europeans are several years behind them in that respect."



The biggest challenge for IS executives in foreign-owned companies is providing the proper IT support for American business demands that may be alien to the foreign parent's experience.

Several executives say parent companies in other countries sometimes just don't understand certain American business practices. For instance, as is standard practice for U.S. manufacturers, Philips Electronics North America typically accepts without dispute returns of damaged or malfunctioning products for exchange, refund or credit. Imagine trying to explain that to your counterparts in Europe, where consumers rarely return products to stores and retailers rarely send them back to manufacturers.

For the same reason, Ikea's American executives had to sell the concept of making returns quicker and easier for demanding American customers unhappy with a scratched coffee table or a chair in the wrong color. Previously, customers had to return merchandise—even large pieces of furniture—to one location, walk to another to pick up a replacement and then take the new item to a third desk to make the exchange. Now, Ruhl says, customers can do it all in one stop, and Ikea employees bring out the replacement item for them.

While such differences will never entirely disappear, they can be managed (see related story, above). "The smart company works at integrating [key] people from both sides and having them translate that information to the rest of their organization," says John F. Johnson, chairman of Lamalie Amrop International, an executive-search firm headquartered in Tampa, Fla. "But both sides have to work at it."

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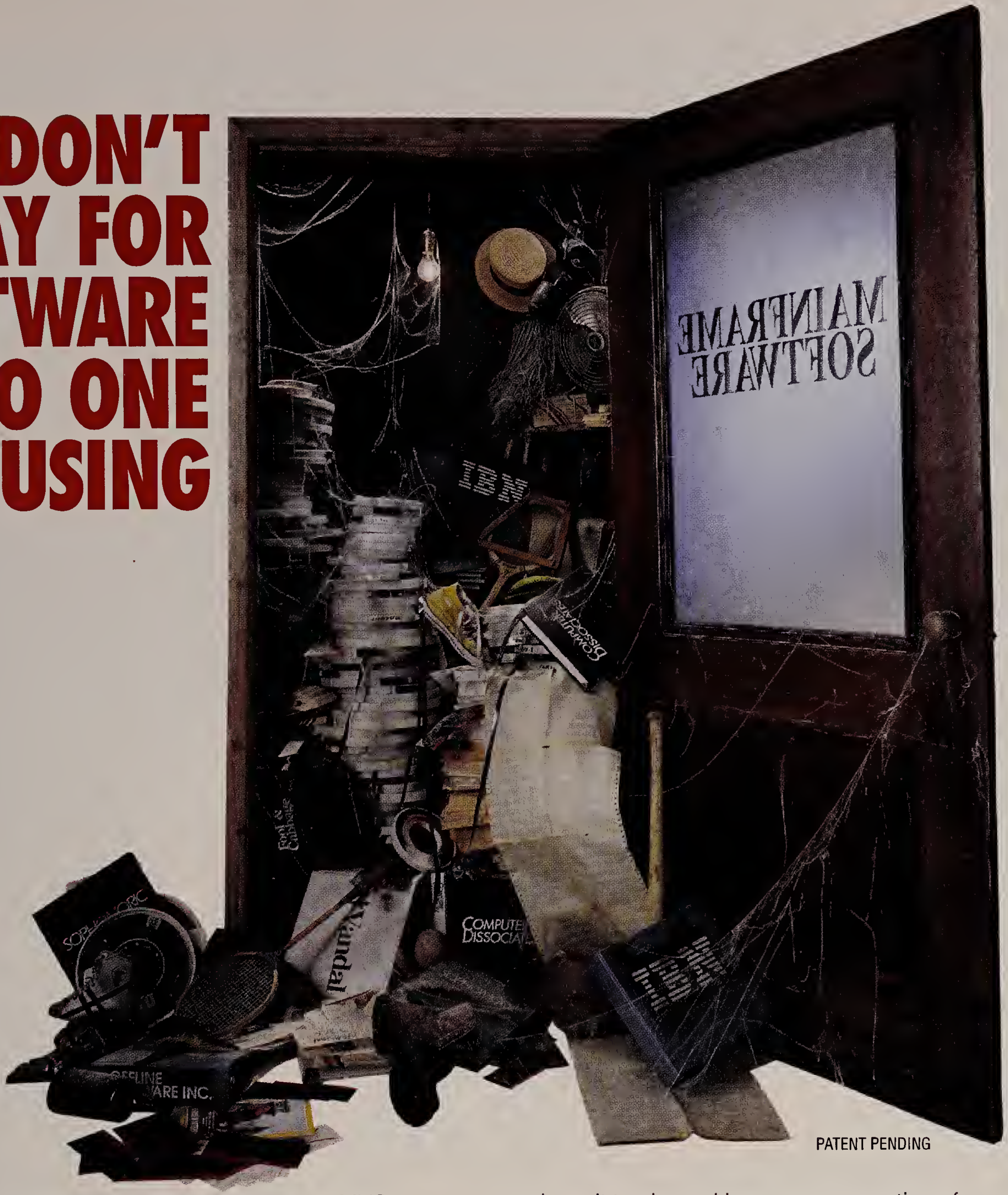

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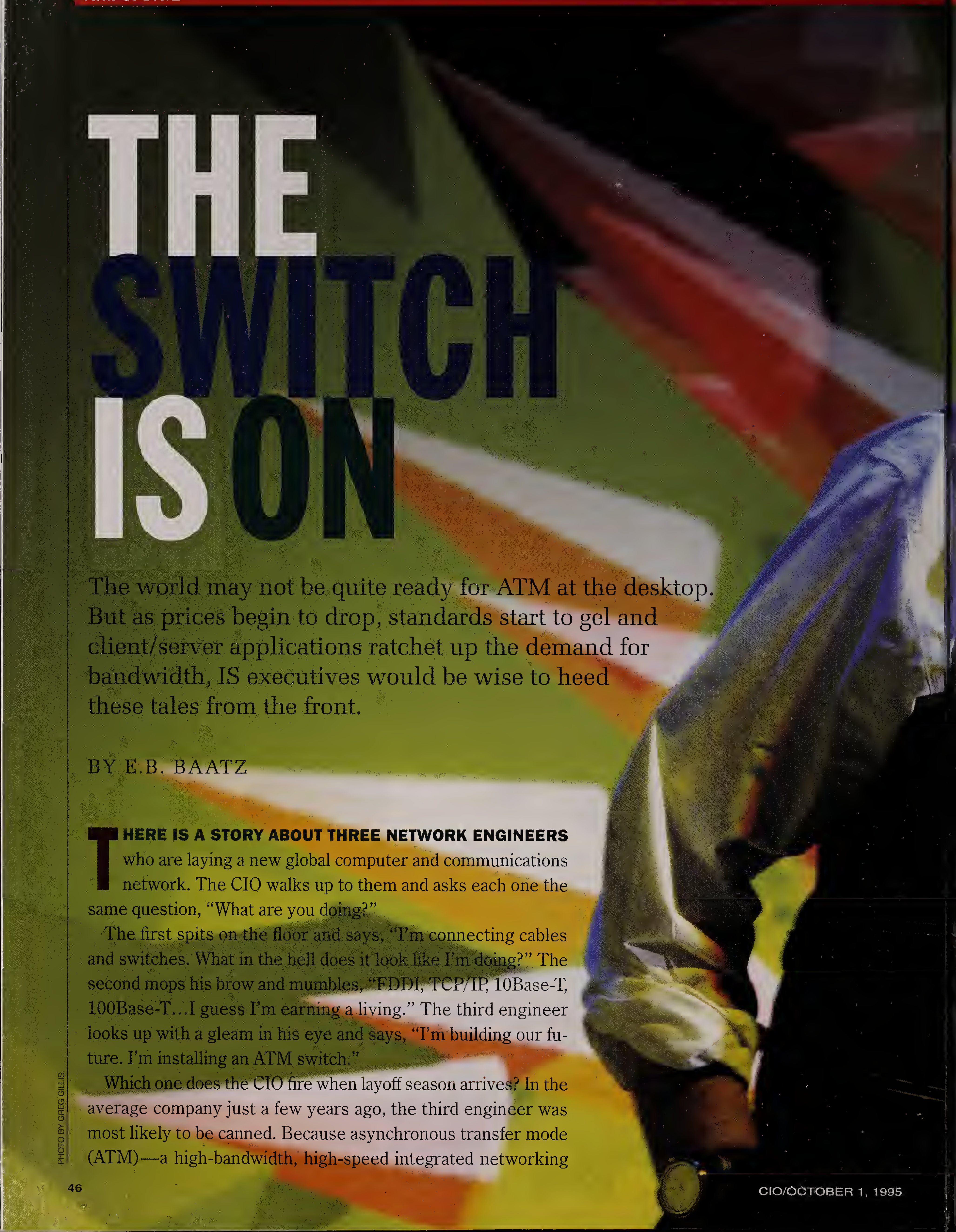


THE SWITCH IS ON

The world may not be quite ready for ATM at the desktop. But as prices begin to drop, standards start to gel and client/server applications ratchet up the demand for bandwidth, IS executives would be wise to heed these tales from the front.

BY E.B. BAATZ

PHOTO BY GREG GILLIS

THERE IS A STORY ABOUT THREE NETWORK ENGINEERS who are laying a new global computer and communications network. The CIO walks up to them and asks each one the same question, "What are you doing?"

The first spits on the floor and says, "I'm connecting cables and switches. What in the hell does it look like I'm doing?" The second mops his brow and mumbles, "FDDI, TCP/IP, 10Base-T, 100Base-T...I guess I'm earning a living." The third engineer looks up with a gleam in his eye and says, "I'm building our future. I'm installing an ATM switch."

Which one does the CIO fire when layoff season arrives? In the average company just a few years ago, the third engineer was most likely to be canned. Because asynchronous transfer mode (ATM)—a high-bandwidth, high-speed integrated networking

technology with the potential to carry voice, data and video simultaneously around corporate headquarters and overseas to far-flung offices—was considered by most CIOs to be too costly, too risky, too hyped.

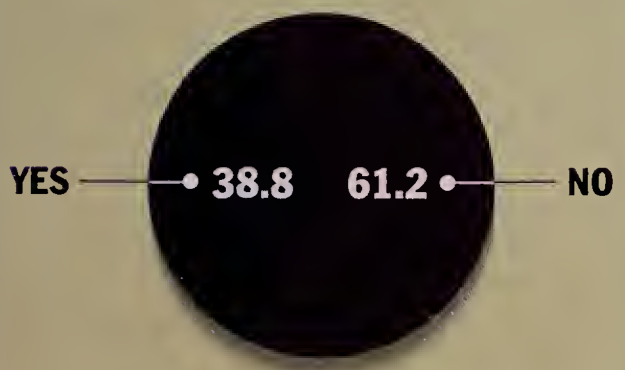
The beef had been that there were no standards. (See "A Switch in Time," *CIO*, Oct. 1, 1994.) Just two years ago, ATM skeptics were saying that public carriers like AT&T and the regional Bell operating companies were unclear about how they would make their new ATM networks interoperable with existing wide area networks (WANs), nevermind the open question of pricing.

On the local area network (LAN) that cables most desktop PCs to the corporate or campus computer server, standards had yet to be set among vendors such as Bay Networks Inc., Fore Systems Inc., Cisco Systems Inc., Newbridge Networks Inc. and 3Com Corp., which were offering their first-generation ATM-compatible equipment back in the early 1990s. And after the cost overruns and technical delays that corporate communications shops had encountered with FDDI (a still-emerging standard for fiber-optic local area networks called fiber distributed data interface)...well, most executives decided just to wait and see.

TIMOTHY KUHFUSS: *"In the beginning, we just wanted to see if ATM technology had a place in the laboratory."*

Demand for bandwidth is up...

Percentage of respondents who are experiencing LAN bandwidth constraints



SOURCE: INTERNATIONAL DATA CORP., 1994 SURVEY OF 500 U.S. COMPANIES

...So plans to move to ATM are accelerating

Networking deployment plans, percentage of respondents

At the desktop

	NOW	3-YEAR PLAN
Fast Ethernet	4%	26%
FDDI	2%	16%
ATM	0%	32%

In the backbone

	NOW	3-YEAR PLAN
Fast Ethernet	20%	34%
FDDI	36%	34%
ATM	8%	52%

SOURCE: FORRESTER RESEARCH INC., 1995 INTERVIEWS OF 50 FORTUNE 1000 COMPANIES

That's changing now, however, as ATM advocates at many companies are no longer considered crazy visionaries. "Hospitals, movie companies and high-tech manufacturers were among the first to explore ATM," says Marlis Humphrey, a senior business development manager for AT&T Paradyne in Largo, Fla., and chairperson of the North America Market Awareness Committee for the ATM Forum. "Today we're seeing an entirely new group of mainstream users—such as banks, smokestack manufacturers and retailers—dipping their toes into this new technology."

Why? For one, prices have come down rapidly. "Prices of ATM products have fallen between 35 and 50 percent per year over the last two years, and I expect this will continue for the next few years," says Gartner Group Inc. analyst Joseph Baylock.

Second, and just as significant, technical standards are beginning to gel. The International Telecommunications Union has been setting formal standards for data links, cell packet lengths and other details. But the ATM Forum, a Foster City, Calif.-based industry consortium of more than 750 companies, including carriers, equipment makers and users, has been speeding the process by filling in gaps with "specification" agreements that guarantee interoperability. For example, the group has established internetworking specifications for frame relay to ATM and is in the process of setting ISDN-to-ATM interface rules.

Most important, burgeoning growth in everyday client/server applications has created the need for bigger, faster networks. In fact, according to a July 1995 survey of 311 companies conducted by Sentry Market Research in Westborough, Mass., 26 percent of network professionals say they plan to buy ATM products for their LANs this year. Paul Strauss, a senior analyst at Sentry, says that new bandwidth-hungry client/server applications—not multimedia or desktop video—are driving this trend. "At sites that are installing client/server applications, ATM trials are proceeding more rapidly than had been expected," he says.

That doesn't surprise the networking experts, many of whom have had a gleam in their eye about ATM since the mid-1980s. For the bleeding-edge adopters of ATM, most of whom have been leading trials and working out the glitches for high-tech companies and research labs, the promise of "grand unification" that ATM offers has been the big lure.

Integrating communications from the desktop to the WAN at speeds of 2.488Gbps and beyond offers a multitude of benefits, from easing congestion on the backbone to reducing unmanageable proliferation of Ethernet segments to bringing unlimited bandwidth to the desktop for high-volume data applications such as imaging, voice, video and multimedia. Most alluring of all, ATM promises to allow the same high-bandwidth applications that can be run over LANs to be transported seamlessly across the WAN, which is impossible using existing technology.

But because this theory of grand unification is still in some ways just a theory, skeptics contend that it's too early to explore ATM technology. Standards, they say, are still too murky. "ATM is compelling and promising, but...right now, it's just a bunch of ideas on the back of a napkin," says Josh Turiel, director of IS for Adlife Marketing & Communications Inc. in Norwood, Mass., who spoke on a panel recently about managing networks in client/server environments.

Even an early ATM enthusiast like Rick Stevens, director of the Math and Computer Sciences Division at Argonne National Laboratory in Argonne, Ill., agrees that ATM at the desktop isn't ready for the masses yet. "There's too much work yet to be done on setting protocols," says Stevens. "And advanced features necessary for the virtual LAN are still too flaky." Currently, if one were to hook a typical PC to an ATM network, around 90 percent of the computer's CPU would be used up just to handle the network connection, leaving little power for anything else.

Nonetheless, Stevens insists that some companies can't afford to wait for the technology to settle down. "For anyone who has to get their communications infrastructure set now for growth over the next five to 10 years, the question is not *when* to do ATM. It is simply *how* to do ATM," he says. And for those organizations that expect to make their networks a critical competitive advantage, it's time to start climbing the ATM learning curve.

In fact, brokerage house Bear Stearns & Co. Inc., mass retailer J.C.

"For anyone who has to get their communications infrastructure set now for growth over the next five to 10 years, the question is not *when* to do ATM. It is simply *how* to do ATM." *–Rick Stevens*

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Penney Co. Inc. and fast-food chain McDonald's Corp. all began ATM pilot projects in 1995. And while these second-wave companies are often reluctant to spill the beans about their strategic ATM plans just yet, those in the first wave are more than willing to talk about the business case for ATM.

Argonne National Laboratory

Argonne, Ill.

Donning just a pair of stereoscopic glasses, and with no protective gear, a scientist in Argonne, Ill., enters the core of a nuclear reactor. She's testing the efficacy of robotics to decontaminate and decommission an aging nuclear reactor in Russia. Sound far-fetched? Well, it's the kind of thing that scientists, using the virtual reality environment and advanced networks at Argonne National Laboratory, are preparing to do today. (See related story in Trendlines, beginning on Page 16.)

Run by the University of Chicago for the U.S. Department of Energy, Argonne National Laboratory is the quintessential hotbed of test beds. The lab's nearly 2,000 scientists, supported by another 3,200 employees, conduct experiments in high-energy physics, advanced materials and superconductivity. Linking scientists around the country in virtual reality environments and enabling high-speed collaborations and real-time control of experiments requires lots of bandwidth, lots of speed. And the lab's traditional computer networks are straining against the scientists' needs.

"Our high-speed networking demands are growing dramatically," says John Unik, director of the Electronics and Computing Technologies Division, which is responsible for the lab's networking systems. But funding for national science labs in the 1990s is shrinking. "I was looking for a magic bullet to meet our future needs and reduce operating costs," says Unik.

Unik and Timothy C. Kuhfuss, associate director of the division, decided to employ ATM in 1994, even though the risks were still fairly high, because no other technology offered the integration potential of ATM.

At the heart of the decision was prestige and the never-ending competition for funding and top scientists. Advanced infrastructure and collaborative research tools allow scientists to crank out papers faster, thus enhancing the lab's reputation, which in turn allows the lab to attract the world's top scientists and garner more money for research. "We figure ATM has a side benefit of drawing in better scientists," says Kuhfuss. "That's why we're so aggressive."

But in 1994, "you could barely get an ATM switch" for the WAN, says Kuhfuss, so the lab proceeded cautiously, investing its small annual equipment budget of about $100,000 incrementally. In March 1994, Unik and Kuhfuss convened the "gigabit drivers working group," a half-dozen Argonne biologists, chemists and physicists who agreed to be the guinea pigs in an ATM experiment. The lab purchased two small ATM switches (one from SynOptics, which merged with Wellfleet Communications to form Bay Networks, and one from Fore Systems) and began beta testing.

"In the beginning, we just wanted to see if ATM technology had a place in the laboratory," says Kuhfuss. The answer that came back from the scientists in the working group was a resounding "yes."

For Rick Stevens, one of the original six end users from the lab's gigabit working group, only ATM had the potential to deliver the capabilities required to support a new $800 million advanced materials research facility being built for the Advanced Photon Source project. Using brilliant X-ray beams to study the structure of materials, the lab will need to move terabits of data from lab instruments to massive computers to interactive video environments in labs around the country, says Stevens.

So, in March 1995, the lab purchased a huge central campus switch, a Concord from Northern Telecom Inc. At Argonne's Chicago-area campus of 35 buildings, already wired with fiber, Kuhfuss has begun testing ATM in a couple of key locations with another 50 to 100 users on the system. Northern Telecom is also the lab's partner in exploring ATM on the off-campus WAN. "We're working out the kinks in reliability, accounting and network management," says Kuhfuss.

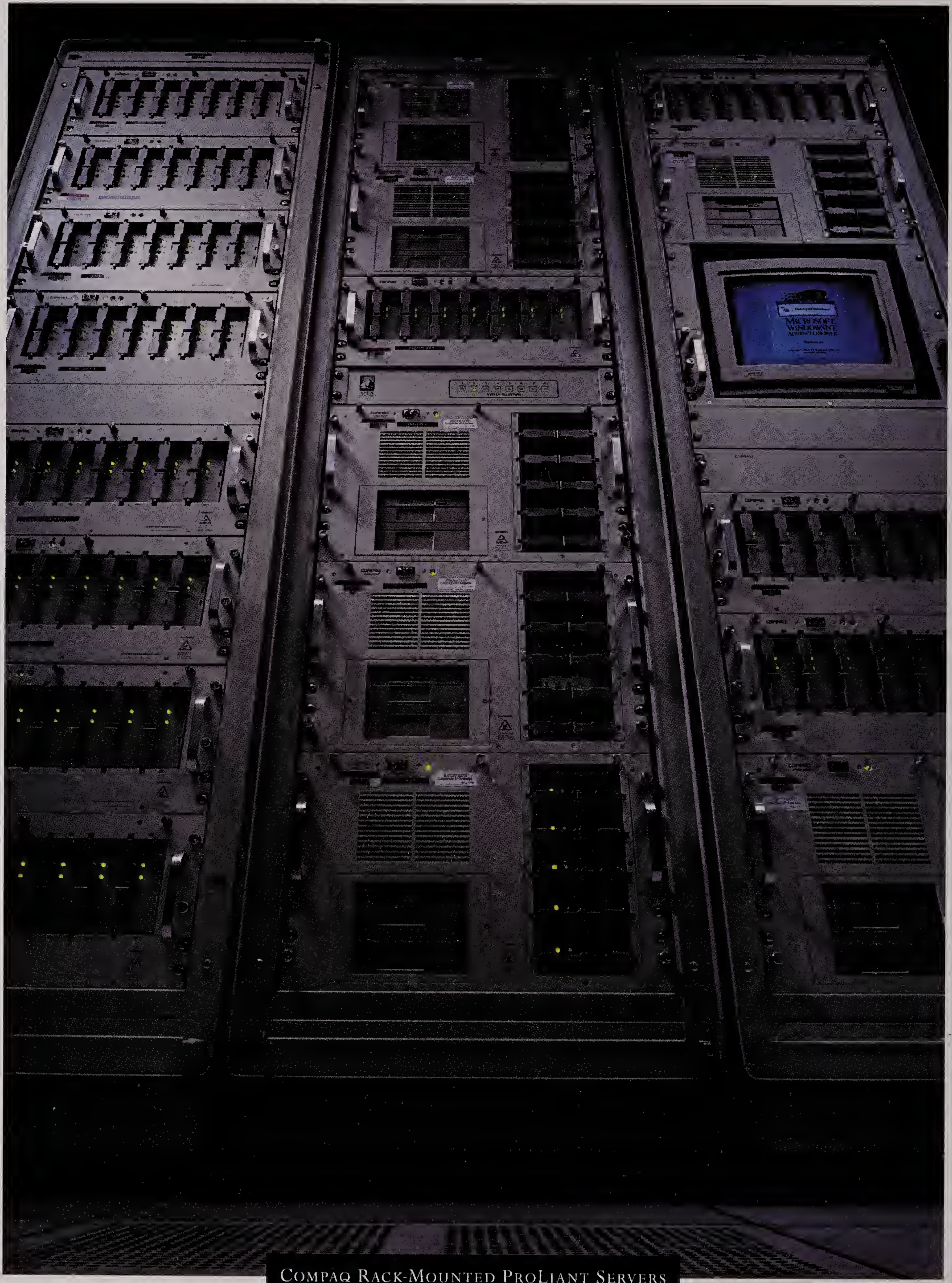
Some risks haven't been as big as Kuhfuss and Unik expected. On the positive side, says Kuhfuss, "I was

Technically Speaking

Officially, ATM is an international specification for a virtual circuit, cell-relay switching protocol that operates at speeds ranging from around 45Mbps to 1.2Gbps—and theoretically even faster.

Technical (and in many cases surprisingly readable) white papers on ATM proliferate among the equipment vendors and carriers. "Asynchronous Transfer Mode: What Network Providers are Considering," the first in a series of ATM white papers from Hitachi America Ltd. of Tarrytown, N.Y., gives a cogent, quick overview of the technology and likely WAN ATM deployment strategies of local exchange and long distance carriers, cable TV and competitive access providers. *CIO* also recommends Eden Prairie, Minn.-based Digi International's white paper entitled, "ATM & the NIC Connection," which reviews the technology and explores ATM network interface card technology for LAN managers.

To join the ATM Forum, an industry consortium of carriers, equipment makers and users, or simply to get more information, contact the Foster City, Calif.-based organization at 415 578-6860, *info@atmforum.com* or *http://www.atmforum.com.* *–E.B. Baatz*



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relatively surprised to see how quickly multivendor interoperability has come along." But on the negative side, the lack of tools for tracking network performance from end to end—or what Kuhfuss calls the "unpleasant state of network management"—has been troublesome. "I'm also a bit leery of LAN emulations, which are used to make the point-to-point ATM network look like a shared Ethernet or FDDI network," says Kuhfuss. Inexpensive, reliable network cards that will allow desktop PCs to be connected to an ATM network are not yet available.

Nonetheless, Kuhfuss is hopeful that LAN problems will be solved soon. The lab's production network, which has to be up and running 24 hours a day, seven days a week, will be filled to capacity by 1997. So the lab will need reliable ATM technology in just two short years, ready or not.

Warren Kirsch put 10 advanced users on the ATM beta test, but unbeknownst to him, hundreds of engineers found out about the new pipeline and just jumped on.

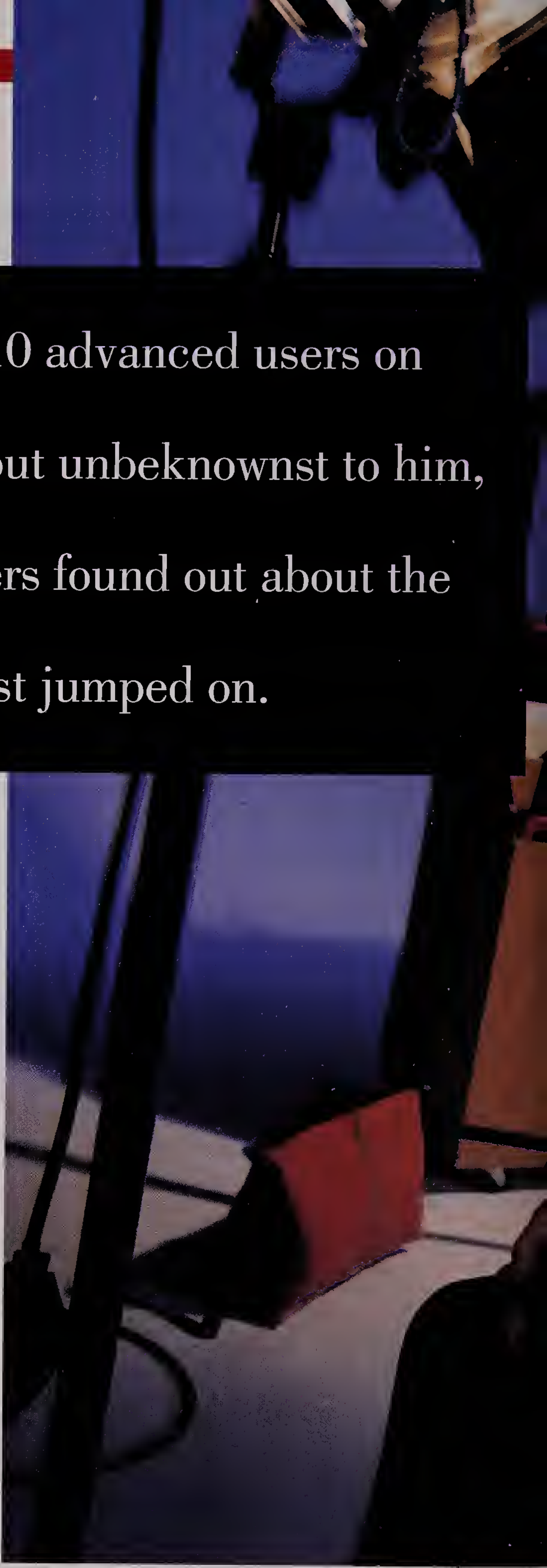
PHOTO BY ED CALDWELL

Tandem Computers Inc.

Cupertino, Calif.

At Tandem Computers Inc., a $2.5 billion computer manufacturer headquartered in Cupertino, Calif., ATM trials have progressed much more rapidly than anyone expected. For the past three years, the company (along with Hewlett-Packard Co., Silicon Graphics Inc., Sun Microsystems Inc., Stanford University and Pacifica School) has participated in WAN ATM trials with Sprint Communications Co.

But the real eye-opener came when Warren Kirsch, Tandem's director of worldwide operations and campus support, was approached by WilTel (now named LDDS WorldCom), which asked to run an ATM trial between the computer company's Cupertino engineers and its Austin, Texas-based engineering facility. Richard Knapp, manager of ATM commercialization at WorldCom in Tulsa, Okla., says that carriers compete to find good partners to test their ATM networks. "There are less than 100 corporations in the U.S. that are employing ATM in the wide area network...and Tandem is out in front," he explains.

WorldCom's aggressive pursuit of Tandem underscores the unique position that many early adopters enjoy. "Because all the carriers are fighting for Tandem's business, I have more negotiation power and I can keep my costs down," says Kirsch.

This lucky cost break aside, Kirsch was attracted to the idea of running the trial for several reasons. For one, engineers were constantly boarding planes to fly between California and Texas, which was costing money and, more important, time. With development cycles down from three years in 1991 to under a year today, and with the price/performance curve falling 50 percent every year, speed has become a critical survival tactic for computer companies. Besides, as a provider of mission-critical computers for stock exchanges, hospitals and telecommunications companies, the company's Silicon Valley executives figured they must move with the ATM wave in order to demonstrate that their products work on these new networks.

The WorldCom/Tandem team got the ATM network up and running between Cupertino and Austin in July 1994 with a 12Mbps ATM link connecting the two locations' FDDI rings. Kirsch put 10 advanced users on the beta test, but unbeknownst to him, hundreds of engineers found out about the new pipeline and just jumped on.

"At the end of the first two weeks, we decided to take the network down for testing and maintenance, and we got all sorts of calls, but we didn't know what was going on," says Kirsch. Three weeks later, he took the network down again for more tests.

"That's when I got a call from the vice president of engineering in Texas,

who told me he had revised and cut his development timetables based on the speed of the new network and he wanted the network up immediately," recalls Kirsch. "I told him that we were just running a beta trial and that it would take me longer than a day to get it back up. And he told me, 'I don't care if this is a beta trial. You make it work or you're fired.'"

Now the California-to-Texas connection is running at 15Mbps and getting cranked up to 45Mbps and even faster. The company wants to be able to form product teams regardless of geographic location. So Tandem has requests for ATM proposals outstanding with carriers for 12 sites—two in Europe, four on the Pacific Rim and six more in the United States.

Just this past summer, the company signed an agreement with a European carrier to conduct transatlantic trials of ATM technology. This trial will link Tandem's Stokely Park office in England with its New York office. "Our plan is to have an ATM backbone completely in place by the end of this year or by the first quarter of 1996," says Kirsch. And for such a rapidly evolving technology, the fast pace is only fitting.

Hughes Aircraft Co.

Los Angeles

Lest one think that all of these ATM trials lead automatically and happily to a pot of gold at the end of the rainbow, consider the case of Hughes Aircraft Co. This Los Angeles company was one of the first to entertain ATM in business applications back in 1993, but as of 1995, any thought of immediately rolling out an ATM network has been put on hold.

The story of ATM at Hughes begins with George W. Buchanan, director of Hughes Business Communications. A 25-year veteran of the U.S. Air Force, this former colonel remembers first hearing of ATM in 1988. "To us, it was something that the RBOCs [regional Bell operating companies] and the carriers and the manufacturers of large switching engines were looking at as a possibility for central office switching," recalls Buchanan. "There was not the slightest glimmer in anybody's mind that it had any sort of network application."

Then Buchanan went to see some ATM equipment at Sprint Communications Co.'s lab in San Mateo, Calif. "All of a sudden, in a flash of light, I realized that the 53-byte fixed cell-length packets had the potential to handle traffic seamlessly on one network." Buchanan had seen the promise of grand unification.

At the root of Buchanan's excitement, however, was money. "We said we would never deploy technology unless we had a clear business objective," he says. His was to cut down on the duplication of networks and to save money on the company's physical plant. To Buchanan, who was managing hundreds of thou-

"All of a sudden, in a flash of light, I realized that the 53-byte fixed cell-length packets had the potential to handle traffic seamlessly on one network."

–George Buchanan

sands of miles of private networks all around the world, this cost justification was enticing.

The company wasn't testing a "killer application" on the network, as in the case of Argonne National Laboratory's Advanced Photon Source project. "We were swimming against the tide from the beginning," says Buchanan. "We felt that it didn't matter if the [killer] applications existed or not.... But because Hughes has such a heterogeneous network environment, we were interested in moving money to the bottom line by reducing LAN and WAN costs."

So in January 1994, after pushing for bids from vendors early in 1993, Hughes began testing ATM service between two California locations, El Segundo and Fullerton, as well as Reston, Va. "This was our proof of concept," says Bob Emmett, Hughes' manager of network architecture. "We wanted to understand the performance and cost for a WAN campus."

Emmett tested cell speed at 45Mbps, ran a bridge from the Ethernet network to the ATM network and tried doing a LAN emulation with an Ethernet workstation talking to an ATM server. "At one point, we had several thousands of users connected [to the test network], and they were not even aware of it," says Emmett. So the system worked.

But corporate restructuring has put plans for full-fledged ATM implementation on the back burner. Since the trial began, the company, under pressure from the post-Cold War defense cutbacks, shut its Fullerton plant. While the company restructures, Buchanan and his CIO, Jim Woods, are waiting to see how ATM fits in with evolving business objectives.

And of course, costs remain the primary concern. "We're also waiting for the cost to be low enough and the requirements high enough to justify the move to ATM," says Buchanan.

In the meantime, Hughes' communications gurus have gained enough expertise with ATM that "we're using our knowledge in designing Hughes products and in writing proposals to government and commercial customers," says Emmett. After all, winning new business is what investments in new technology are all about. And that, as the saying goes, is nothing to spit at. CIO

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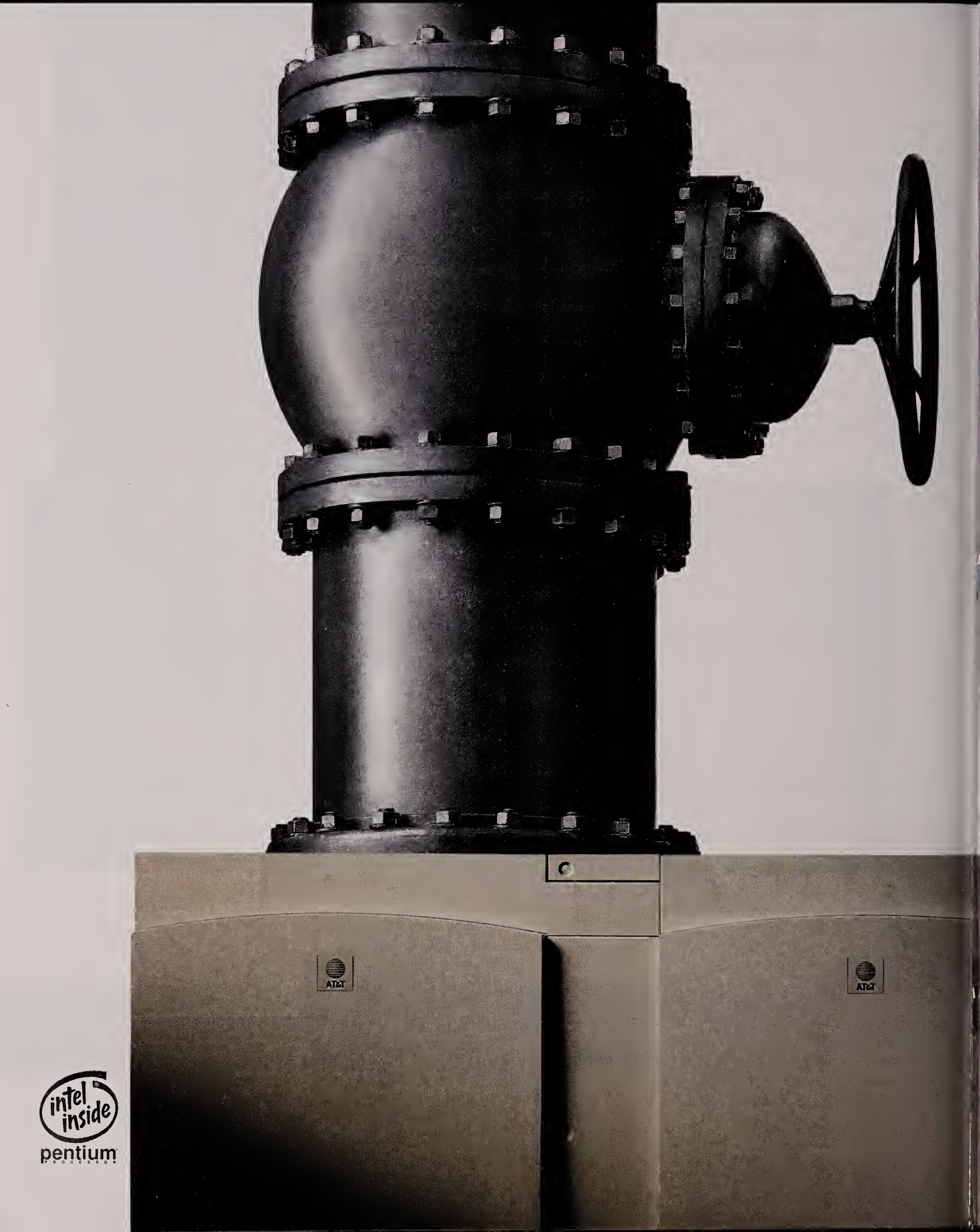

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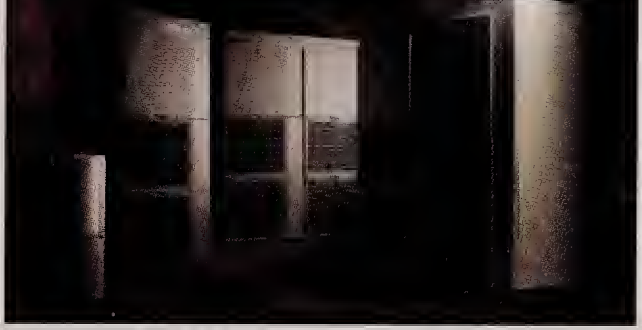

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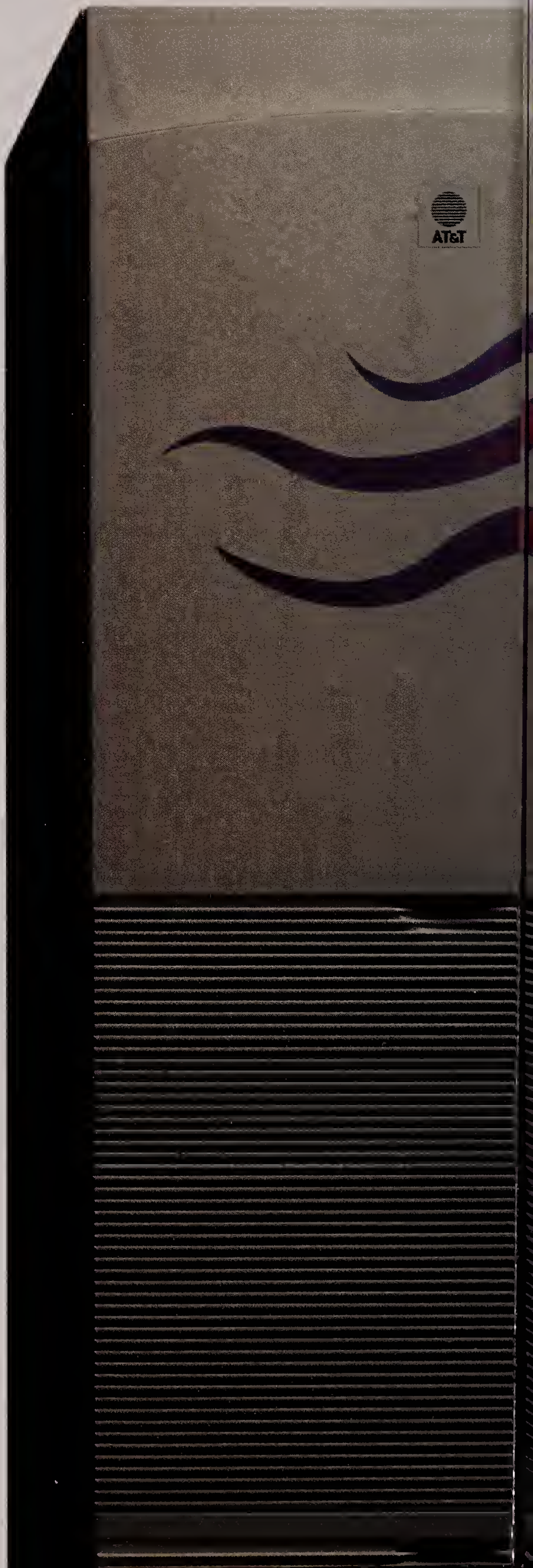

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Competing interests

BY RICHARD PASTORE

operational excellence may be at the **heart** of much of today's business thinking, but it has little to do with **what it** *takes* to make a company *truly* successful

COMPETITIVE ADVANTAGE IS ONE OF THE THREE GOLDEN ASPIRATIONS of any ambitious CIO. Along with adding value and setting strategic agendas, creating competitive advantage is a pipe dream for many a CIO. The main reason it's a dream more often than a reality is that information systems departments are too often pigeonholed into an internally focused operational support mode. But it doesn't have to be that way, says one of the most influential modern theorists in competitive strategy.

MICHAEL E. PORTER, the Roland E. Christensen professor of business administration at the Harvard Business School, wrote the landmark 1980 work, *Competitive Strategy: Techniques for Analyzing Industries and Competitors.* The ideas presented in the book, and its successors, *Competitive Advantage: Creating and Sustaining Superior Performance* and *The Competitive Advantage of Nations,* reconciled historical views on competitiveness and defined the concept of "unique positioning." Porter's ideas later became the basis for one of the required courses at the business school.

Porter is now developing a follow-up to his seminal works, parts of which are expected to appear in feature form in the *Harvard Business Review* this fall and more fully in a book he expects to finish next summer. His recent research has been a reaction to what he sees as the last decade's worrisome infatuation with operational improvement efforts—something he contends does little to sustain competitive advantage. In effect, Porter tells *CIO* Senior Editor Richard Pastore, IS and the businesses it serves are both missing the strategic mark.

> "If companies are going to **sustain competitive advantage,** they *can't* do it by being **more efficient** at running the business. **They have to have a distinctive way of competing.**"

CIO: *What concerns you most about the way companies are looking at competitiveness?*

PORTER: As companies emerge from the last decade, many are preoccupied with operational effectiveness—restructuring, reengineering and improving efficiencies. These improvements are a necessity in today's competition, but they alone are not enough. They are approaching a point of diminishing returns. If companies are going to sustain competitive advantage, they can't do it by being more efficient at running the business. They have to have a distinctive way of competing.

The necessity of carving out a distinctive competitive position is not understood as well as it needs to be today. In a lot of companies, there is a mistaken sense that there is only one right strategy for that industry, and if one company can be the first to discover and implement it, they'll win. We've found from our research over the years that this way of thinking is ultimately self-destructive. If everybody's racing to discover one right strategy, nobody wins.

CIO: *Your past work has described the importance of making tough tradeoffs to define a unique and sustainable competitive position—choosing which markets and customers to serve and which to forgo. Has this become an even tougher prospect today?*

PORTER: When a company picks a unique competitive position, it has to be inconsistent or incompatible with its competitors' positions in order to be sustainable. If it isn't, its competitors can simply replicate what it does at a modest cost.

Because they have been focusing on operational effectiveness and eliminating wasted effort, companies have gotten used to enjoying the best of all worlds. They've lowered costs and improved quality at the same time. Against that backdrop, managers are often unwilling to make a choice of which markets and customers to serve and, even more difficult, which not to serve. But if they aren't willing to make those tradeoffs in their strategies, they're destined to become stuck in the middle. They'll inevitably try to do a little bit of everything for a little bit of everybody, and they won't have a competitive advantage.

CIO: *What's behind your new theory of complementary activity systems?*

PORTER: Rarely does sustainable advantage grow out of a single activity in a business. A company doesn't get sustainable advantage simply because it has some unique product design or a unique sales force. Those kinds of advantages tend to be visible targets to imitate. If a company relies on one activity as its key strength, all its competitors are going to work very hard to match that—especially if it is dubbed a best practice against which everybody else is benchmarking.

Sustainable advantage comes from *systems* of activities that are complementary. These

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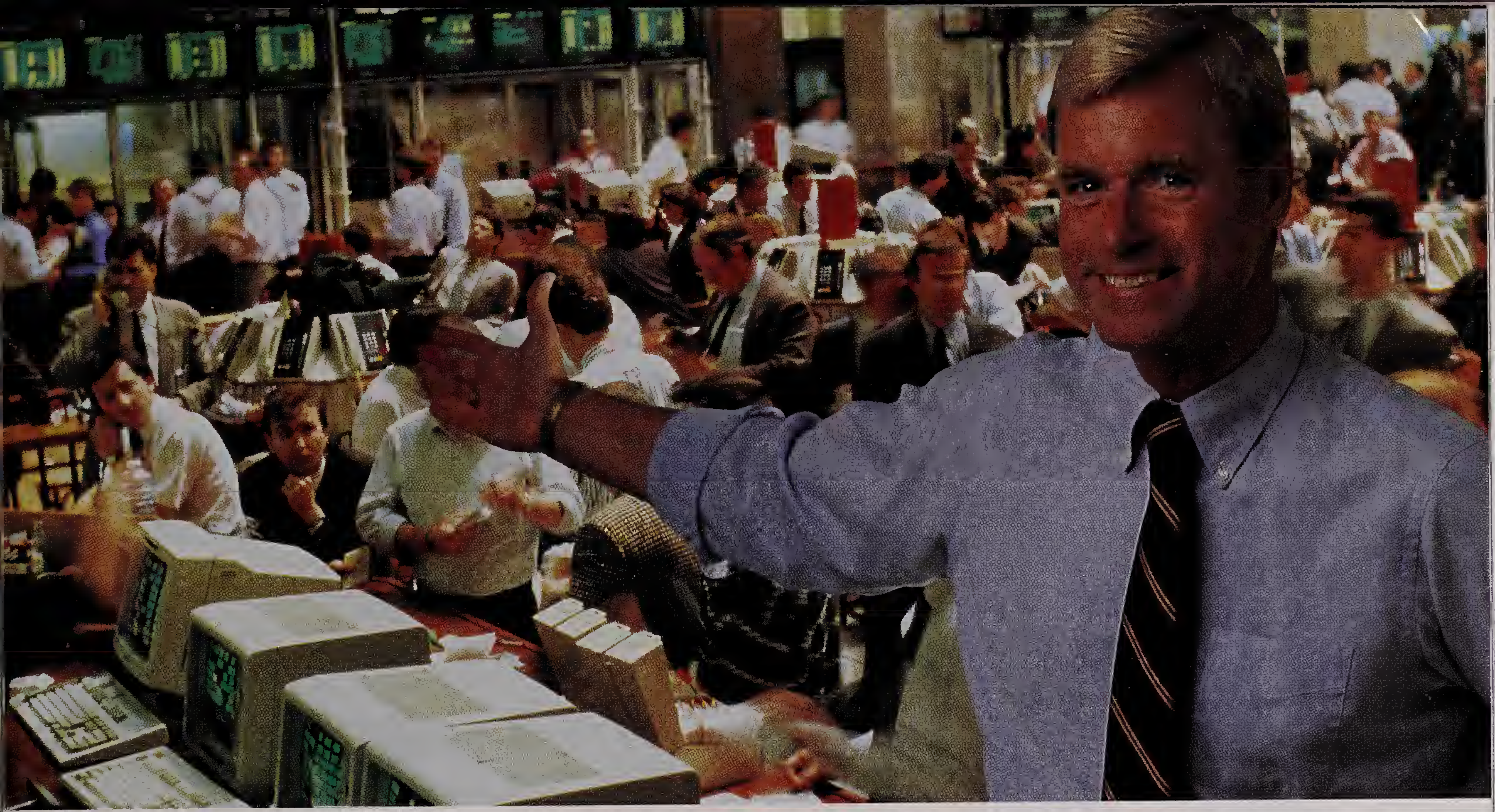

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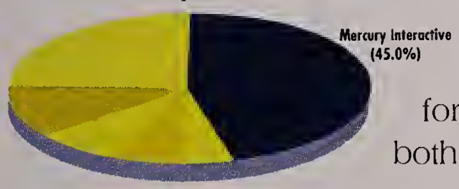

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ECKXCO

> “Companies with sustainable competitive advantage **integrate lots of activities** within the business: their **marketing,** service, designs, **customer support.**”

“complementarities” occur when the way a company performs one activity provides not only an advantage in that activity, but it also provides advantages in other activites. For example, if a company has a very good inventory management system, it can also offer faster delivery and do so cheaper than a company without the inventory management system. Companies with sustainable competitive advantage integrate lots of activities within the business: their marketing, service, designs, customer support. All those things are consistent, interconnected and mutually reinforcing.

As a result, competitors don’t have to match just one thing, they have to match the whole system. And until rivals achieve the whole system, they don’t get very many of the benefits. It’s like climbing a cliff; until you get to the top of the cliff, you can’t stand and begin to walk again.

CIO: *Where does IT fit into these concepts? Can it actually promote the creation of these complementarities?*

PORTER: Yes. In fact, in many cases, achieving complementarities across activities is heavily affected by information technology. A production process can benefit a company’s after-sales service if there is effective information exchange. If IS people need a new rallying cry for how to create competitive advantage, maybe it ought to be around the idea of tying activities together and achieving complementarities.

CIO: *You fault business for being too focused on operational effectiveness for the last decade, but isn’t the IS function operationally oriented by nature? How can it be otherwise?*

PORTER: In the mid-1980s, IT was all the rage as a tool for competitive advantage. Then we got swept by the wave of reengineering and restructuring, and the IT function has really been diverted back to the operational stuff. We now need to return to what was starting to happen earlier, when IT was changing industry structure, altering the rules of competition and spawning whole new businesses.

IT can be strategic, but my experience has been that a lot of IS organizations are inward looking. Most IS departments today are too often defending their turf, too worried about policing the behavior of renegade managers.

CIO: *What should IS focus on to create strategic advantage?*

PORTER: IT applications are absolutely fundamental to managing a company today, so IS is part of a corporate strategy whether the management thinks that way or not. The challenge for IS departments is to start understanding how to play the strategic role better. From a strategic point of view, every in-house system should not be replicating somebody else’s best practice but instead be tailored to the company’s unique positioning. The traditional way of doing that was to develop proprietary systems. Today, more cost-effective off-the-shelf systems can be modified around a particular strategy.

To play the strategic role, IS people have to know the customer, understand the manufacturing process and take a business view of the company. Unfortunately, there is so much technological change that you inevitably get specialists who tend to be fairly narrow people.

Another problem is metrics. The traditional criteria by which IT applications have been chosen have been ones of operational effectiveness—How many people can we save? How much faster can we process the paper?—rather than more strategic measures, such as how much have quality or service levels gone up. That needs to change.

CIO: *What can chief information officers specifically contribute toward competitive positioning?*

PORTER: CIOs understand the enabling technologies that allow distinctive positions to be created, so the CIO has an important role to play. But that doesn’t mean that systems should be built internally, nor should the CIO control all the systems activity in the company. The need for integration and certain standards and protocols will continue, but the idea of central IS as traffic cop and enforcer is less important, and the CIO’s role should in-

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creasingly turn to supporting competitive advantage.

CIO: *That suggests outsourcing some systems. Isn't IT outsourcing purely a non-strategic, cost-lowering technique? Can it contribute to competitive advantage?*

PORTER: Outsourcing may be very much the right thing to do in order to improve operational effectiveness. If the company isn't world class in systems, then it had better find a way to get there. Having said that, anything you outsource will rarely be a competitive advantage because others can get that same outsourced service. Essentially, you've taken that activity off the strategy table. Competitive advantages are established when you can create and control something that is distinctive and unique to your organization.

I'm a big believer in outsourcing and think we have a long way to go toward shutting down inefficient internal activities. There are many more systems activities that can be moved outside, but that's not going to give us a competitive advantage. It's simply reducing a disadvantage.

> "If I were in an **American company** *trying to compete with the Japanese,* **one of the first** places I'd look is **I.T.** **Japanese companies are slow** to adapt to these **new techniques.**"

CIO: *So should CIOs identify core competencies and protect them from outsourcing?*

PORTER: That's too narrow a conception. IS people need to work with management teams to define a distinctive and unique position for the company. Once they understand that position, the IS director can determine where tailored, in-house systems would add particular value. In those areas, full outsourcing doesn't make a lot of sense. Those systems ought to be preserved and controlled inside the organization. When a company chooses to outsource, it accepts an average way of doing things, and that's going to make it more similar, not more different.

CIO: *IT benchmarking is another pursuit that would seem to lead to imitation rather than distinctive positioning. Is this another non-strategic practice?*

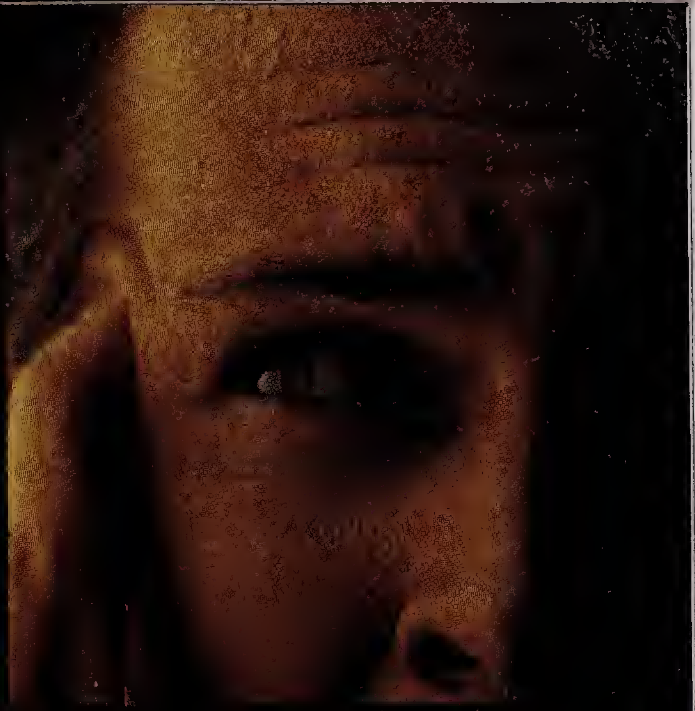
PORTER: Benchmarking can have strategic value, but it can only tell one company where it stands versus another. That comparison is an operational effectiveness question. Once the company has that information, it has to get itself up to best practice level. Then the next question is how to be unique in this practice, given the organization's strategy. Ideally, everything a company does ought to be reinforcing its unique strategy, so it should never simply accept, say, the way some other company processes orders.

CIO: *Does your research with European and Japanese companies indicate that their competitive contribution from IS is dramatically different from U.S. companies?*

PORTER: In general, I've found European and Japanese companies to be behind—in some cases, significantly—in the strategic and even operational use of IT. In Japan, the companies are quite advanced in the factory but not at all in the office. The whole idea of networking and groupware there is still in its infancy. One potential advantage that U.S. companies have right now is IT. If I were in an American company trying to compete with the Japanese, one of the first places I'd look is IT. Japanese companies are slow to adapt to these new techniques.

CIO: *Does that mean your new book will have a chapter on IT?*

PORTER: Rather than dedicating a chapter to IT, it will be sprinkled throughout the book, in the spirit of this conversation. The best way to think about IT is not as a separate thing, but as part of what makes a company unique in all its activities. CIO



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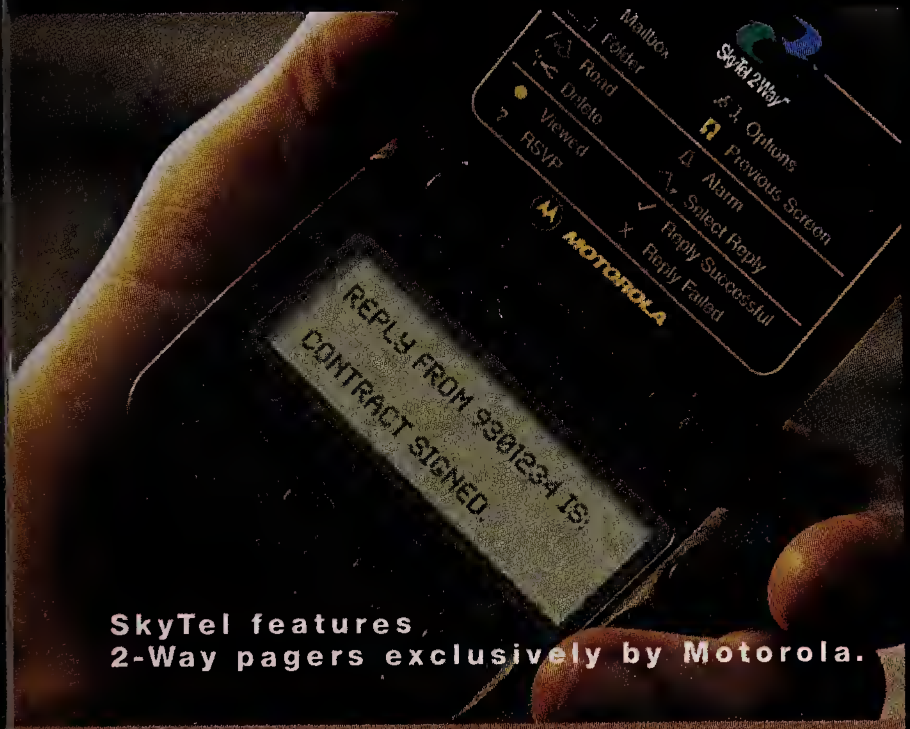

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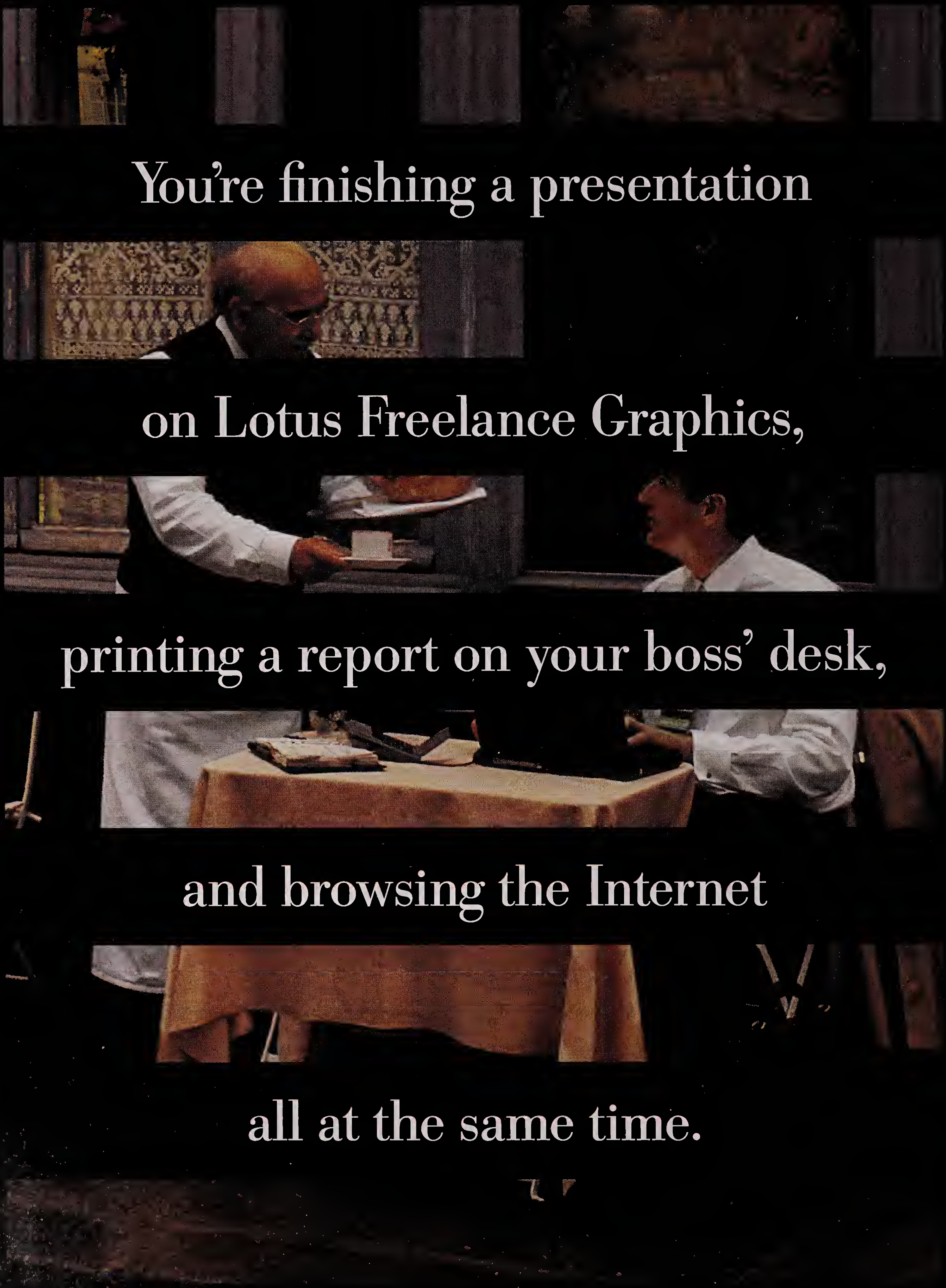

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Déjà VIEW

STORYLINE

CIO **has examined many organizations as they launch major strategic-system implementations. But work continues on these systems long after the ink dries on the magazine's pages. Here we offer an update on efforts at Sallie Mae, Ryder and Gallup. The projects are distinct, but in each case, a new or upgraded operating system has boosted productivity, customer service and the bottom line.**

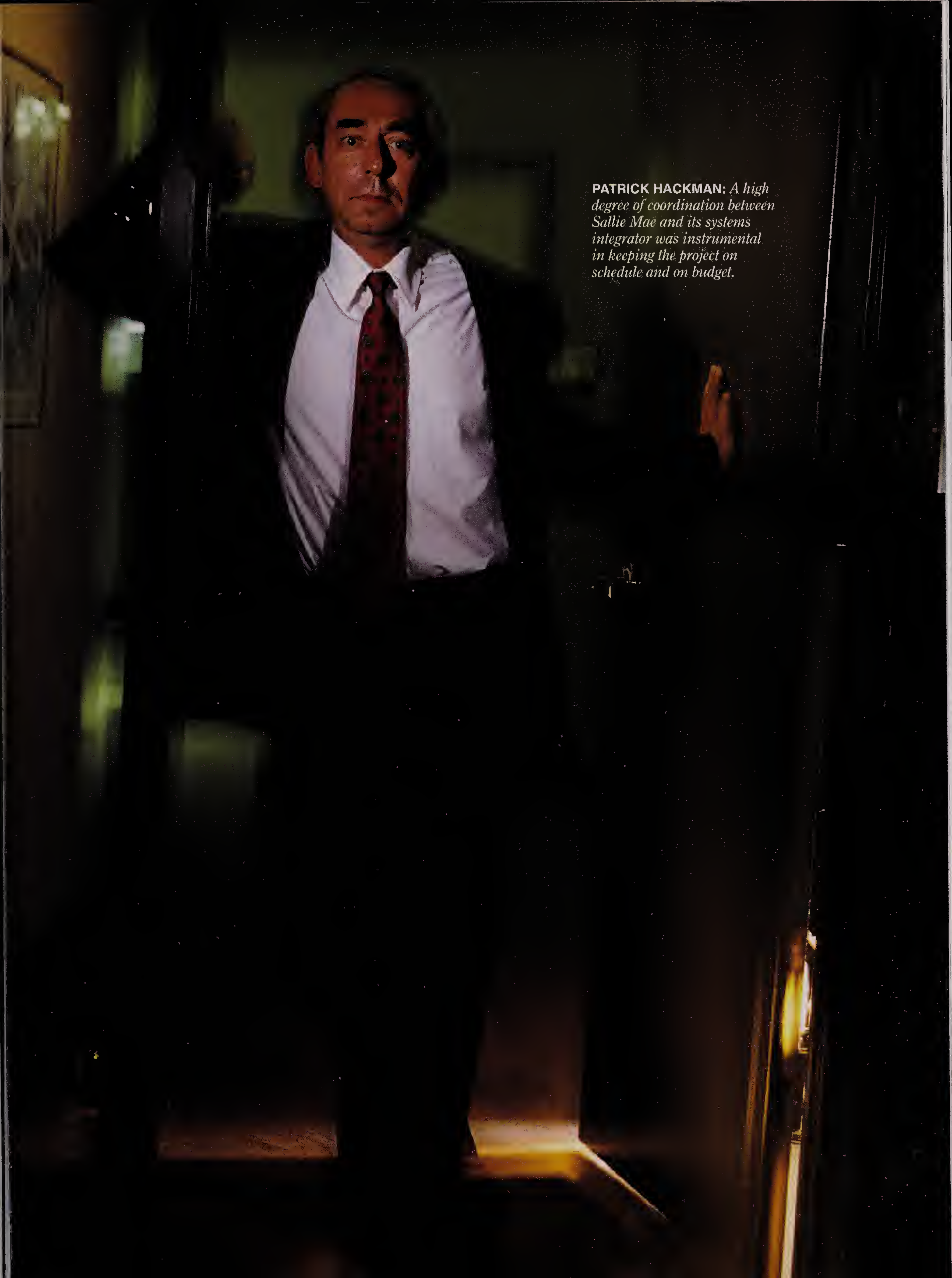
BY PETER FABRIS

THE STUDENT LOAN MARKETING ASSOCIATION, better known as Sallie Mae, was in the early stages of a massive document imaging and operating system upgrade project aimed at eliminating mountains of paper when *CIO* reported on the company in the April 15, 1994, issue. Today, the system, operating successfully, has enabled a quantum leap in customer service and quite likely has saved the company at least $10 million—the cost of constructing an additional loan-processing center. If not for the productivity gains enabled by the system, Sallie Mae's loan volume likely would have forced the company to build that new center and to break ground on another by now, says Patrick Hackman, vice president of operations management. Additionally, the company has reduced its average response time to process loan deferments and other transactions from a week to several hours, an improvement in service providing a competitive edge.

Sallie Mae

Sallie Mae, a federally chartered, publicly held corporation that backs banks in the issuing of student loans, is among the 20 largest financial services companies in the United States. Headquartered in Washington, it lends $8 billion a year through banks to 6 million students and maintains more than $53 billion in assets. The company receives about 24 million loan-related documents annually and must make the information in those documents accessible to 3,000 of its 4,800 employees in seven regional loan-servicing centers scattered from Spokane, Wash., to Panama City, Fla.

PHOTO BY MANUELLO PAGANELLI



PATRICK HACKMAN: *A high degree of coordination between Sallie Mae and its systems integrator was instrumental in keeping the project on schedule and on budget.*

> Sallie Mae has reduced its average response time to process loan deferments and other transactions from one week to several hours.

In recent years, the number of Sallie Mae-backed loans has grown 18 percent a year and the number of documents associated with each one by 25 percent. With an average of 22 forms per file that must be maintained for up to 33 years, Sallie Mae stores more documents than just about any organization outside government. Even after a loan is initially approved and processed, any number of events can require its file to be dug up again. For example, many recipients who began paying off loans after graduating or dropping out later receive deferments when they return to school, requiring Sallie Mae to update their files. Additionally, banks, credit unions and other financial institutions often request status updates on Sallie Mae-backed student loans when graduates apply for car loans and home mortgages.

Previously, Sallie Mae measured its response time to such information requests in days. The previous Amdahl Corp. mainframe system split account information over as many as 10 separate screens. Employees often had to jump between several screens and track down paper files to find all the data they needed to answer an inquiry. In order to get files, representatives sometimes had to physically retrieve them from the regional center's vault. Often, the paper file's contents were scattered among some of the center's 15 departments, and it took an average of a week to pull together an entire file. In some cases, files had to be shipped from center to center, wasting several weeks while a customer waited for an answer.

Borrowers often communicate with Sallie Mae first by mail, following up with a phone call a few days later. In the past, employees took at least a week to file incoming letters and forms, so when a caller referred to recent correspondence, the service representative often had no record of it. Now, correspondence is usually scanned into the system the day it arrives.

Representatives can access all documents received after the system went online from their desktops, viewing all information they need on a single Windows screen. However, they must still view older, rarely used documents on microfilm because Sallie Mae decided it wasn't cost-effective to scan them in.

All information, including letters, canceled checks and Sallie Mae's various forms, is scanned in using Eastman Kodak Co. high-speed scanners and stored on Cygnet Systems Inc. optical jukeboxes. Telephone representatives view a split screen on their PCs, with one window dedicated to scanned documents, another to a new, simplified internal account database, and a third to older account data from the legacy mainframe system.

The project, which Hackman calls one of the largest of its type, is the result of a collaboration with systems integrator Price Waterhouse. The two parties signed a five-year, $55 million deal. Price Waterhouse committed a total of 80 employees, who have worked side by side with Sallie Mae's 135-person team at the Herndon, Va., operations center to enable a high degree of coordination between the partners. Hackman says that working arrangement was instrumental in keeping the project on schedule and on budget.

Although development and implementation generally went smoothly, the huge project hit a few bumps along the way. Most major impediments occurred in the communications between the mainframe SNA protocol and the TCP/IP networks at each loan-servicing center. The relatively new software packages that translate between the two protocols continue to need fine-tuning. "The [unrefined] state of technology has caused most of the problems," says Hazen Dean, assistant vice president of imaging systems development.

Despite these difficulties, Hackman and his implementation team say the project has gone as well as anyone could have hoped. The payoff—faster customer service and increased transaction-processing productivity per worker—is clear, and the client/server architecture leaves room for system modification, which might become necessary with ongoing serious discussions in Washington about privatizing Sallie Mae. "We don't know what we're going to do three to five years from now," Hackman says. If, for instance, future new owners decided to revamp business processes, the system should be able to accommodate them.

Ryder

After a period of intensive self-analysis in 1992, Ryder System Inc. refocused its business strategy more sharply on providing its customers with a total transportation and logistics solution. IT has played a critical role in this strategic fine-tuning, in which the Miami-based company emphasizes providing real-time, mission-critical logistical and inventory information to corporate customers and local truck-rental agencies.

When *CIO* profiled Ryder in the Feb. 1, 1994, issue, the company had undertaken several projects to automate paper-based systems. The company has upped the IT ante since then, says CIO Bruce Parker, who joined Ryder about a year ago. Ryder formalized its commitment to continuous IT improvement in

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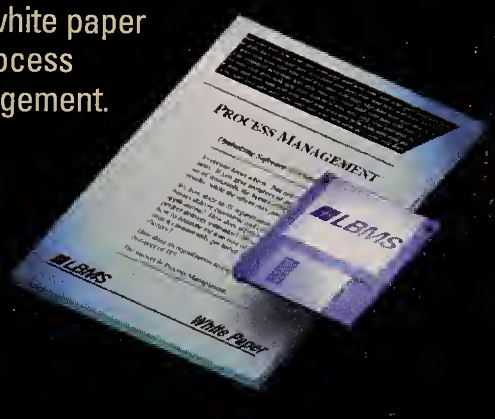

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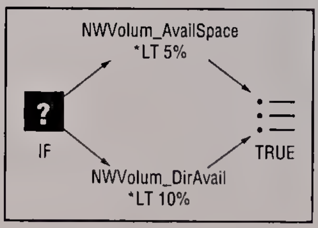

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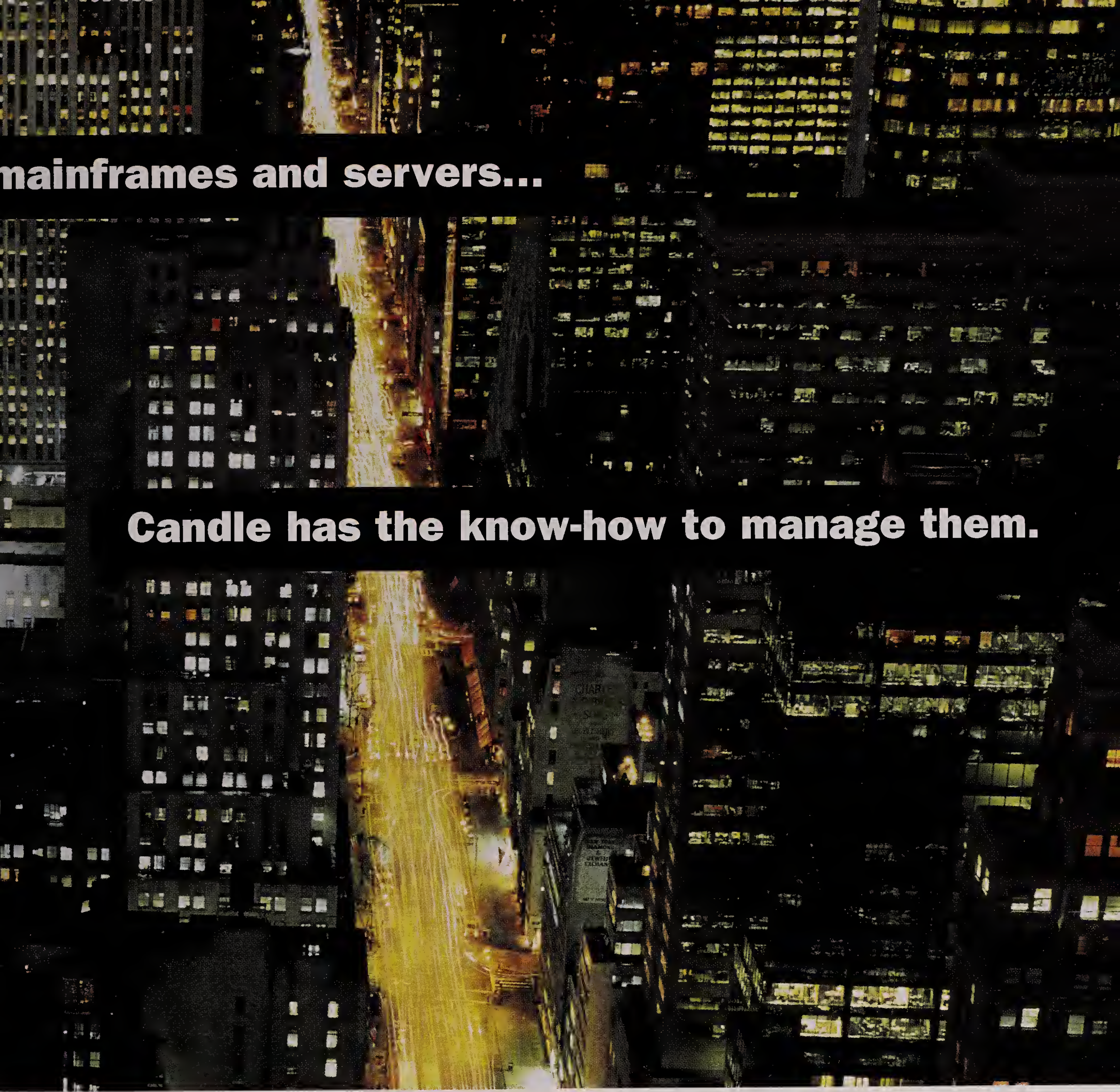
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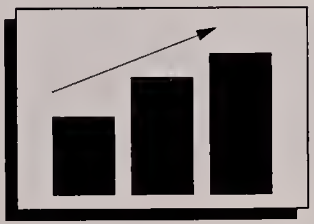

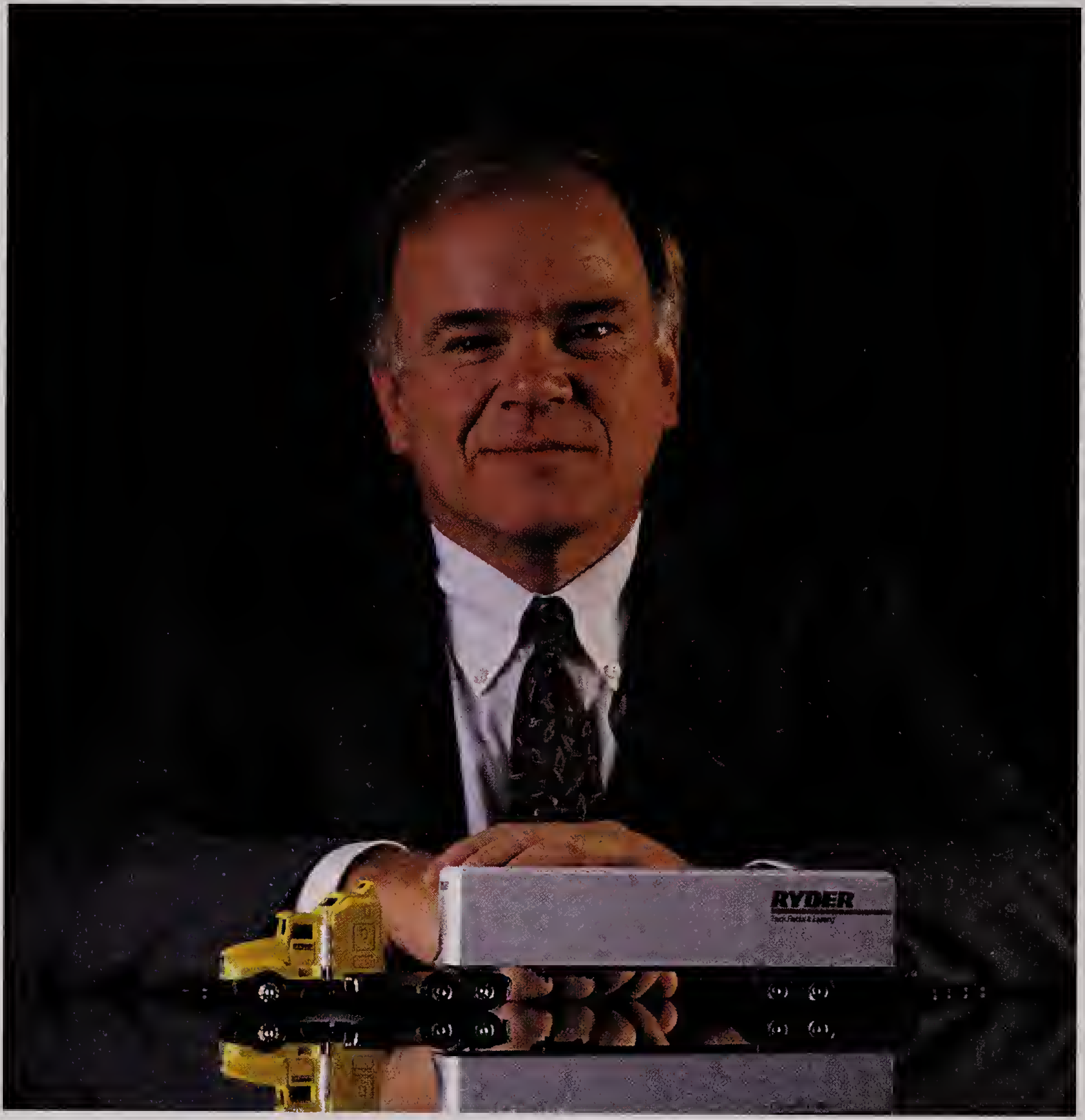

BRUCE PARKER: *"The consumer truck business is an inventory balancing act."*

December 1994 by adopting the Ryder Technology Promise, an internal manifesto pledging to upgrade the company's own business processes and employee performance and helping its external customers do likewise. This commitment evolved from an explosion of IT projects in recent years. As a result, IS staff has doubled in two years, from about 300 to about 600.

Much of IS's attention today is on Ryder Dedicated Logistics (RDL), the company's integrated logistics division. With sales increasing by more than 40 percent a year, RDL, the fastest growing of Ryder's five business units, is expected to account for about $1 billion of the company's $5 billion-plus annual revenues. The third-party logistics industry has ballooned from next to nothing several years ago to more than $20 billion annually as companies focus on core competencies and outsource many other functions. RDL has emerged as a market leader in logistics outsourcing, with a number of heavyweight customers, such as General Motors Corp. and Whirlpool Corp., signing on in recent years.

RDL offers a total logistics solution, forging all links of the supply chain. After analysis of customers' transportation needs, Ryder devises a detailed logistics plan integrating shipping, warehousing and manufacturing needs. For example, the company's $56 million pact with Whirlpool calls for moving $2 billion in raw materials to the appliance manufacturer's 11 U.S. plants. Ryder provides all inbound logistics services, accommodating Whirlpool's just-in-time inventory needs.

Because many customers use just-in-time inventory management, Ryder's ability to meet JIT demands with the help of electronic inventory shipment tracking capability has proven essential in inking these new contracts. "We've extended our routing tools to tie into warehousing and inventory control systems," Parker says. That means electronic data interchange with customers and suppliers, such as tire manufacturers for auto plants.

Although the consumer rental business isn't growing nearly as quickly, it hasn't been neglected by IS, because the company views IT as vital to reaping profits in this area as well. Until a few years ago, the company relied on paper records for customer rental information and fleet management but found paper-based systems much too slow for effectively allocating resources. "The consumer truck business is really an inventory-balancing act," Parker says. Obviously, when trucks sit unused in dealers' lots, they don't generate revenue. In order to use truck inventory most efficiently, Ryder needs to know—in real-time—which sites have demand for more trucks and which sites have idle ones. Ryder-FIRST, an automated order entry, sales and consumer rental inventory management system that computerized a formally paper-based system, provides the solution.

One primary example of improvement attributable to Ryder-FIRST is the company's quick response to the FBI's request for information on the truck used in the bombing of the federal building in Oklahoma City. Within minutes, Ryder was able to identify the last renter of the truck from a serial number on an axle. Under the old paper-based system, Parker says, the company would have needed anywhere from a day or two to a week to locate the critical information that led to the indictment of suspect Timothy McVeigh.

IS continues to improve this system. For instance, a more detailed pricing component is being added so that one-way rates can be tailored for different areas. So if more people are moving from Los Angeles to Phoenix than vice versa, Ryder can lower the one-way rate from Phoenix to accurately address

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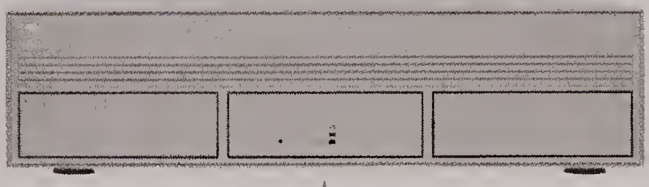

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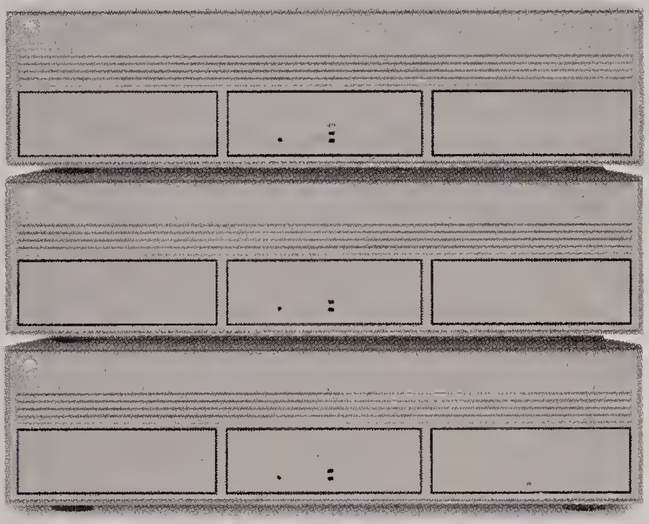

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> Gallup's Item Analysis system tracks interview questions, enabling interviewers to find the most effective ones by identifying the inquiries that have yielded successful job applicants.

supply and demand. Ryder typically adjusts these rates weekly. RyderFIRST and a related system yielded a 2 to 3 percent increase in vehicle allocation efficiency, Parker says.

When *CIO* profiled Ryder in early 1994, the company was using a financial system, deployed several years earlier, that computerized business processes for the consumer rental division. Currently, IS is rolling out the third generation of this system—Ryder's Financial Information System—to integrate financial information globally using Walker Interactive Systems' accounting software. Ryder has also jumped headlong into international waters, recently entering new markets in Eastern Europe and Latin America to add to its operations in the United Kingdom and Canada. Global expansion requires overseas implementation of integrated logistics operating systems such as RyderFIRST and worldwide integration of corporate financial systems so that managers can gauge how business is faring, especially in these new regions.

Previously, each district used separate financial systems, a situation unsuited to the company's current global mind-set. Just as Ryder's customers require transportation of goods across national borders, Parker says, its systems must be equally adept at cross-border data transfer.

Parker's predecessor, Dennis Klinger, now a marketing executive with Florida Power & Light Co., staunchly advocated user and customer involvement in the Ryder system design. Parker carries on Klinger's philosophy. "We have a lot of forums with external customers in many industries," he says. "We have to understand clients' needs and what we have to do to modify our systems [to accommodate them]."

In the Sept. 1, 1994, issue of *CIO*, Craig Nordbrock, then The Gallup Organization's director of network technologies, said he hoped a new client/server system would not only boost the company's ability to help clients hire the right employees but lead to increased IT adoption throughout the organization as well. Although Nordbrock has since left the Lincoln, Neb.-based company, his vision seems to have been realized.

The success of Gallup's ESP system, which is used to develop questions and schedule interviews for Gallup's hiring service, created momentum for more IT integration into the business. "Our internal objective is to have all of our principal activities monitored and tracked by software," says Eldin Ehrlich, Gallup's director of application development. That goal includes all areas of Gallup's business, including surveys (the ubiquitous Gallup Poll), a job-applicant selection service and seminars.

Gallup's job-candidate screening service is a fast-growing part of the company's business. Gallup interviews contenders for its clients to whittle down the pool of applicants to a manageable number, say a half-dozen, for each opening. The service is designed to provide a customized, methodical means of uncovering the most promising finalists. Key to accomplishing that goal is knowing which questions will yield important details about candidates' abilities and psychological makeup that have proven to be accurate indicators of successful job performance.

Therefore, officials viewed as critical a system that would track and research questions used in interviews. Questions that produce the best insight into a candidate's psyche become apparent over time. For example, interviewers want to determine whether candidates for sales jobs are confident about speaking to prospects up close, making eye contact and using other standard sales techniques. The system indicated that certain questions worked better than others at eliciting the information and identifying candidates most likely to succeed in those areas. The Item Analysis component of ESP, which began under Nordbrock's direction, tracks interview questions, enabling interviewers to find the most effective inquiries by identifying those that have yielded successful job applicants.

Gallup

Developing a customized interview for each client requires extensive question testing. Before Item Analysis went online, researchers tested an average of 200 questions to come up with 50 for each interview. After the system was in place, the database helped researchers narrow the field by dropping the average number of questions tested for each job opening to 125, saving research time and often producing a more effective group of questions. That has allowed Gallup to take on more clients and "turn around projects more quickly and competently," Ehrlich says. As a result, the number of candidates processed by the system is growing by 30 percent an-

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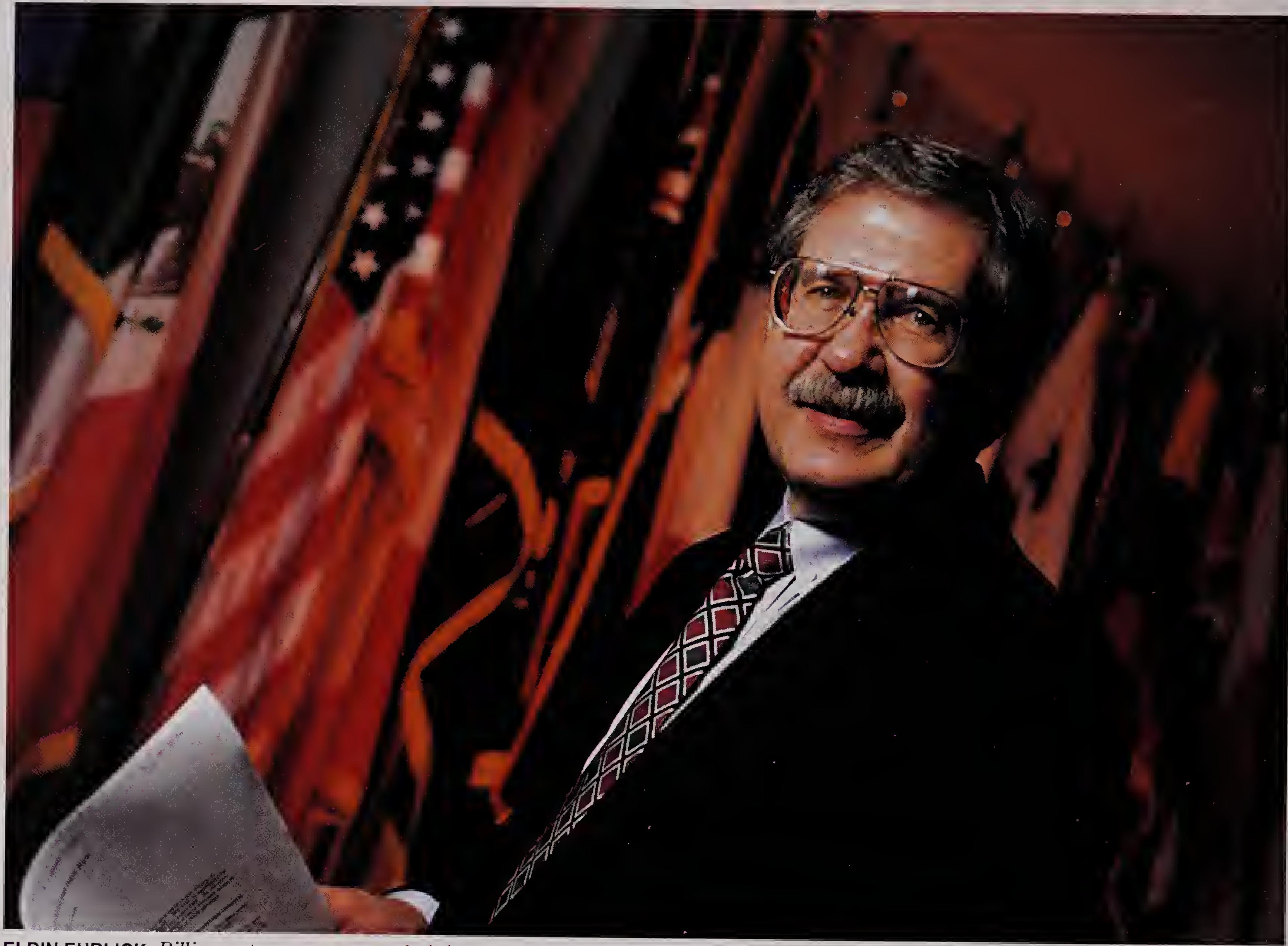

ELDIN EHRLICK: *Billing systems can access administrative information such as the number of interviews conducted for a client.*

nually. Since *CIO* last reported on it, this system has been refined to improve the historical perspective of the efficacy of individual questions, helping to shorten the interview preparation phase from a few weeks to a few days.

ESP, which supports research into questions and shows interviewers' questions online during interviews, has also been upgraded. The major modification provides interviewers with questions for an abbreviated screening interview. Gallup uses this truncated interview process when, for example, a client needs to fill five openings in a related area. The prescreening process determines for which position a candidate would be best suited and provides insight into developing questions for a full-length interview. This refinement required "big-time recoding," Ehrlich says. It represented a formidable system-design challenge in which the central question was, "How do you maintain control of a group of questions that serve two or three purposes?"

Data security has been a continual source of concern for IS. When ESP first went online, access was limited due to the data's strategic nature. Since then, IS has improved safeguards, so more employees have access to data, based on their level and needs. For example, employees who book interviews have access only to the system's scheduling component; they are locked out of the interview-question database. Only people with a direct need to access those questions—interviewers and researchers—can reach this sensitive information. But even among these employees, there are several layers of security. For example, interviewers who specialize in sales and marketing can view all questions in that field but not questions in other business areas.

Ehrlich's staff also integrated ESP with Gallup's billing systems, so those systems can access administrative information such as the number of interviews conducted for a client and whether recommended candidates were actually hired. Previously, Gallup had no reliable way to track such information, a situation that led to inaccurate billing. The last step in the process, linking billing reports to accounting systems, is scheduled for completion this fall.

Five years ago, the company had little IT involvement in strategic areas of the business, Nordbrock said last year. Today, however, it appears that a poll of Gallup employees would indicate a high percentage of IT awareness throughout the organization. CIO

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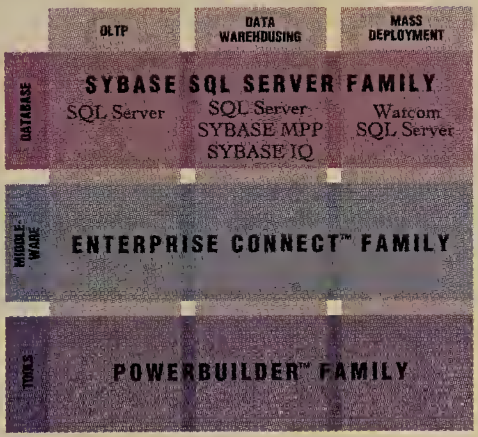

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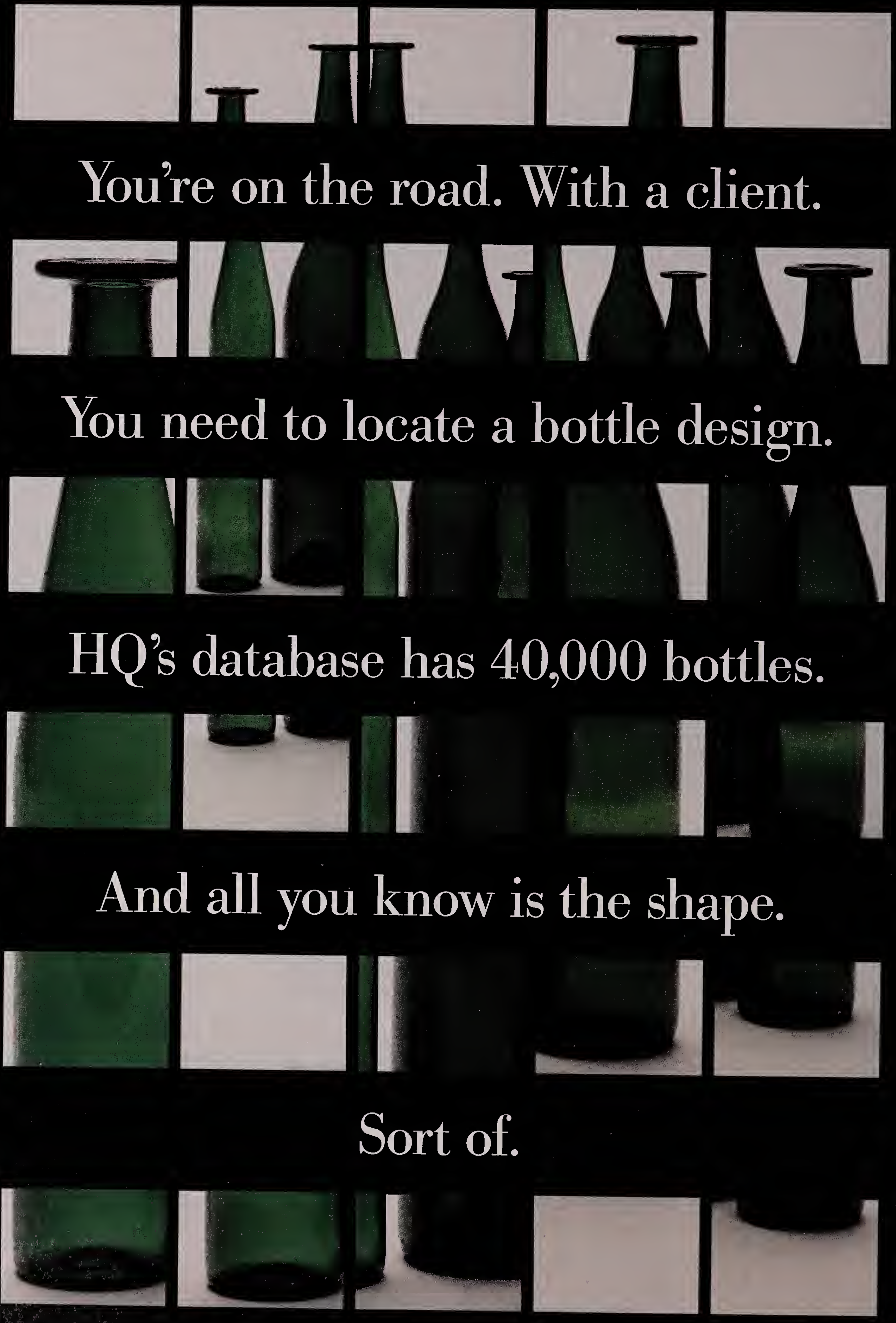
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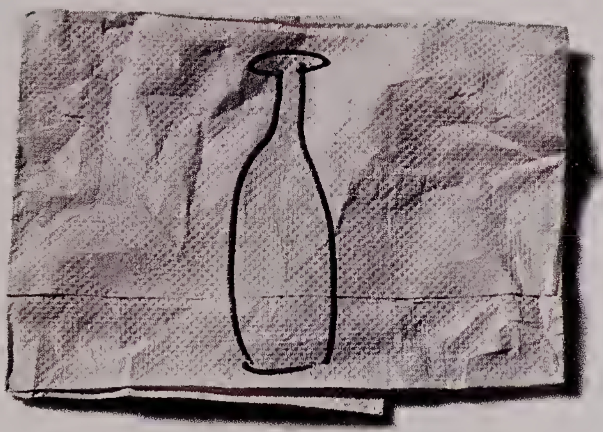

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Myers-Briggs testing helps companies identify the different personality types of team members who are tempted to point fingers and declare...

I'M OK, YOU'RE Really Weird

BY CAROL HILDEBRAND

IF MT. RUSHMORE COULD BE RESCULPTED to honor the best and the brightest of business theory, you probably wouldn't be surprised to see the likes of Michael Hammer or Peter Drucker gazing out over South Dakota's Black Hills. But who would expect to look up and see the visage of Carl Jung? Or Katherine Briggs and Isabel Myers?

On the face of it, the trio would seem to be keeping strange company with the business gurus. After all, they were involved in the unbusinesslike field of human emotions and psyche. Jung created his "theory of personality type" in the early 1920s, and in 1943 the mother-daughter team of Briggs and Myers used Jung's theory to develop the Myers-Briggs Type Indicator (MBTI), a test to determine individual personality types. Recently, however, many companies have transplanted MBTI from its psychological roots into some decidedly corporate territory.

Myers-Briggs basically categorizes individual personality types by analyzing how people prefer to receive and process information, how they form opinions and how they communicate those opinions to others. It divides the world into four basic personality preferences: Introversion or Extroversion, Intuition or Sensing, Thinking or Feeling, and Judging or Perceiving. These preferences are then combined into 16 specific personality types. (See chart, Page 96.)

Every individual will have a natural tendency toward one preference or the other; put the four preference categories together, and you can identify an individual personality type. For instance, a fun-loving journalist type might be categorized as an extroverted, intuitive, feeling and perceiving type of person (or an

ILLUSTRATION BY TED PITTS

Jung at Heart

The following scale descriptions are simplifications (and perilously close to oversimplification) of quite complex, rigorous and hard-to-understand descriptions presented by Carl Jung.

Every person usually has a preference for one of the two opposite choices (designated by a letter) in each of the four categories. That does not mean they do one at the exclusion of the other; most people are more inclined toward one way of thinking but can incorporate by degree both viewpoints into their temperaments.

ENERGIZING *(How a person is energized)*

Extraversion Ⓔ	**Introversion** Ⓘ
Preference for drawing energy from the outside world of people, activities or things	Preference for drawing energy from one's internal world of ideas, emotions or impressions

ATTENDING *(What a person pays attention to)*

Sensing Ⓢ	**Intuiting** Ⓝ
Preference for taking in information through the five senses and noticing what is actual	Preference for taking in information through a "sixth sense" and noticing what might be

DECIDING *(How a person decides)*

Thinking Ⓣ	**Feeling** Ⓕ
Preference for organizing and structuring information to decide in a logical, objective way	Preference for organizing and structuring information to decide in a personal, value-oriented way

LIVING *(Lifestyle a person adopts)*

Judging Ⓙ	**Perceiving** Ⓟ
Preference for living a planned and organized life	Preference for living a spontaneous and flexible life

SOURCE: CONSULTING PSYCHOLOGISTS PRESS INC.

ENFP). On the other hand, an accountant could very well be at the opposite end of the scale as an introverted, sensing, thinking, judging type (or an ISTJ).

That doesn't mean that introverts sit in a corner all day furrowing a thoughtful brow while the extroverts dance a conga line down to the copy machine; it's just a primary preference. By Myers-Briggs' definition, an introvert derives energy from his or her internal world of emotions and ideas, while an extrovert draws from the outside world of people and activities for spiritual sustenance.

What has all this admittedly squishy stuff to do with revamping business processes or creating an organization that works across functional silos? Everything, as it turns out. It takes softer skills—like conflict resolution and communication—to build a trusting collaborative environment, says Andrea Dyer, manager of business consulting at Arthur Andersen in San Francisco. And that, she says, is at the heart of successful team building. "You need to work on the soft side to get the hard results," she adds.

So leading-edge business managers today are turning to personality indicators such as the Myers-Briggs test to boost the success rate of team-led projects. Teams work with an MBTI-certified facilitator to take the half-hour or so test and then analyze the personality types and group dynamics that emerge from it. But one half-day session, although illuminating, is not sufficient to build team trust. "It takes a lot of application" says Timothy Irwin, a principal at Irwin & Browning Inc., an Atlanta management consultancy. "You need to reinforce it and revisit it. Basically, you should interpret the world with it."

Such total immersion into individual personalities rather than the bottom line may sound extreme, but Dyer says teams ignore these issues at the risk of decreased productivity.

"When you put a team together, there can be a lot of anxiety, competitive attitudes and emotions that don't surface because we don't allow that to happen in a work environment," she says.

For example, when Hewlett-Packard Co.'s North American distribution organization in Sunnyvale, Calif., created a team to implement SAP's software, it invested a lot of upfront time examining the communications and personality dynamics of the team, drawing on Myers-Briggs and material from Peter Senge's *The Fifth Discipline* in learning organizations. At the time, says Dyer, doing the preparatory work made the group feel like it was spinning its wheels. But a short time into the project, she says, they realized that in the long run, the team was far more productive for having done the early work.

Barbara Garbus, another HP team member, agrees. "When we went into it, we were very busy, and thought, 'We don't have time for this touchy-feely stuff,'" she says. But as

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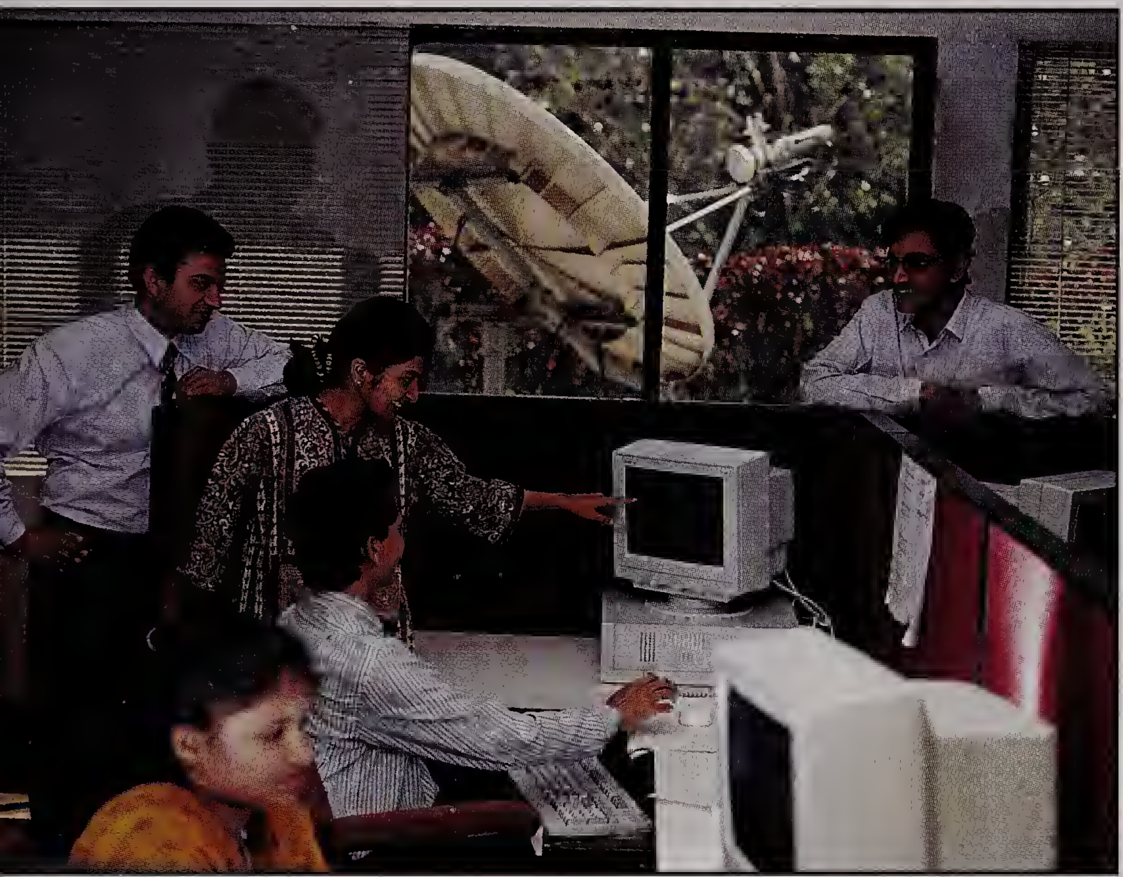

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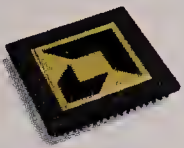
The Kentucky Derby. The Preakness. The Belmont Stakes. The first horse in 25 years to sweep the Triple Crown. If you'd only known. Well, know this: Advanced Micro Devices is the world's second-largest producer of microprocessors. For 26 years, we've delivered premium performance without a premium price. And now AMD is launching the next generation K86 Superscalar™  family of Microsoft Windows® compatible microprocessors. This technology will dramatically change the nature of competition in the PC industry. Innovation like that could bring you quite a payoff

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the group gelled, they realized that "it wasn't like losing days—it was like gaining weeks."

Putting that much energy into something that may not offer tangible results can be a leap of faith. Since most people are not comfortable opening up emotionally in a business environment, a lot of turbulent emotions get repressed—which only causes them to manifest themselves later on in the project. But for those who take the time, using Myers-Briggs can lead to very productive teamwork. For example, executives can use Myers-Briggs to create a team with a balanced ratio of personality types necessary to reach the project's objective, or they can examine how different personality types are likely to interact. Since each personality type has its own strengths, MBTI feedback helps team members accept and value coworkers with very different type combinations.

Carol Smallback, a team advisor at Corning, N.Y.-based Corning Inc.'s technology services group, took the test when her group switched to teams. What she learned as a result helped to increase her tolerance for others' "different strokes." Smallback says she now realizes that she is more comfortable with the big-picture perspective than with the details of a project, and she recognizes that people who emphasize the latter used to frost her pumpkin. "I realize that we can benefit from each other's differences," she says. "Detail orientation may have irritated me in the past, but now I can see how it is helpful."

ALTHOUGH QUANTITATIVE business types may be tempted to dismiss MBTI as so much unsubstantiated bushwah, the test is backed by more than 40 years' worth of data collected by the Center for Applications of Psychological Type (CAPT) in Gainesville, Fla. The nonprofit clearinghouse has amassed more than 230,000 individual profiles, demonstrating how they break down along occupational lines. The results are enlightening. (See story, this page.) For example, many companies' IS departments and end users perceive each other as speaking almost another language. Kim N. from sales just wants an immediate e-mail connection to the outside world—she doesn't care about the sordid technical details. Tom D. in IS, however, can get almost misty-eyed thinking about an elegant configuration for the new e-mail connection, even if it takes a little longer to devise. By looking at MBTI data, it turns out there's a reason behind this disconnect.

Vive la Différence

IT'S ONE OF THOSE INSTANCES where opposites don't attract. IS workers and marketing types often seem destined from the start to gravitate toward their own kind. The biggest difference, it seems, is that IT folks are much more interested in solving a problem with technology, while marketing people want to see results. No wonder they look at each other as if from another planet.

The reason for the discord, says Charles Martin, a psychologist at the Center for Applications of Psychological Type in Gainesville, Fla., is that certain personality types tend to congregate in specific professions. CAPT's figures show that the two biggest personality clusters for marketing personnel, for example, are extroverted, intuitive thinkers (15.66% are ENTJs, and 13.25% are ENTPs). The top two IS personality types, on the other hand, are ISTJ (22.62%) and INTJ (15.54%)—introverted, logical thinkers. The technology devotees' preference for introversion often makes it difficult for them get a conversation going, which frustrates extroverted marketeers who are used to tossing conversational balls into the air until a solution pops up.

So if you sometimes feel like you and your marketing colleagues are speaking a different language, relax. You may say to-ma-to instead of to-mah-to, but if both sides can learn to understand the other, there won't be a reason to call the whole thing off.

For IS workers in particular, learning to work on teams—especially as distributed-computing projects lead to more dynamic interaction between IT folks and the user community—will be a challenge. The personality preferences of many computer professionals can be almost diametrically opposed to those of, say, your average Joe from marketing, and that can make it difficult for IS folks to deal with the social dynamics involved in teamwork. "It's tough to build teams with [IT professionals]," says Irwin. "It takes a lot of effort to get the IT folks to function effectively in a team."

When the IT group at Armstrong World Industries Inc. in Lancaster, Pa., switched from a hierarchical management structure to self-directed work teams, they used MBTI as a training tool and found that a majority of the IS staff were introverts—a plus for communing eight hours a day with a tube, but not so helpful for ferreting out user needs. "IS still needs people who are technical, but they also need to have a sense of communication," says Robyn Alspach, manager of information systems development at Armstrong. She says that not only did MBTI raise their group consciousness about the importance of communication skills, but it helped the group screen for an appropriate personality when it hired an end-user liaison.

So what is a typical IS personality type? A study in the *Journal of Psychological Type* (1988, Volume 15) that examined the IS department of a NASA contractor found that the three most prevalent types were ISTJ, INTP and INTJ. That translates into an introverted, intuitive person who arrives at conclusions by applying facts rather than feelings or personal values.

As Alspach's group discovered, a preponderance of introverts in one department can make it harder for

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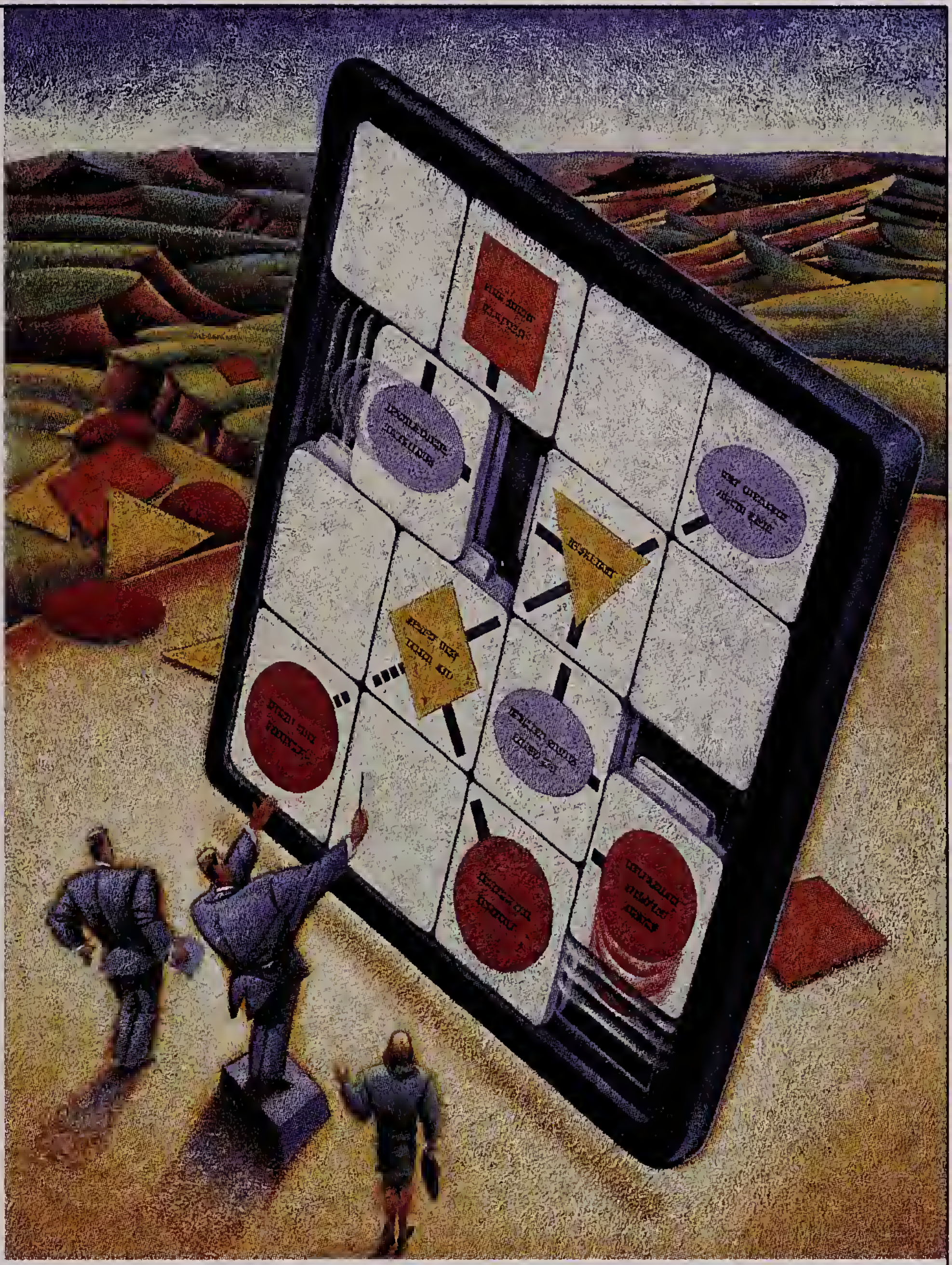

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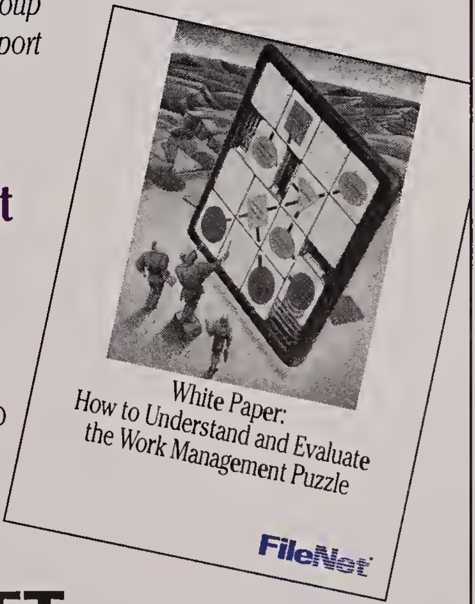

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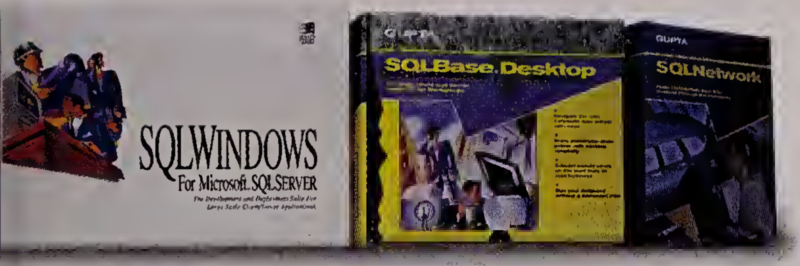

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that group to focus outward. "It's not that an 'I' can't have effective relations, but the reaching out that comes naturally to extroverts is simply more of a stretch for them," says Madeline Weiss, president of Weiss Associates Inc., a Bethesda, Md., consultancy.

Weiss also points out that since "IS types are invariably thinkers," (as evidenced by the T), they can run into trouble building relationships and looking at the project from an end user's point of view. "The value of having a user involved in a project and getting user input on a regular basis is not always clear to them," she says. Further, says Irwin, the combination of NT (intuition and thinking) creates a very conceptual person, driven by high internal standards to build the most logically pure, potent application (or anything else, for that matter) possible.

Line business users, on the other hand, are usually more interested in getting things done on deadline (Myers-Briggs calls them Sensers, or S's). As a result, the conceptual person is sometimes torn between compromising personal competence standards as opposed to meeting customer standards, says CAPT Vice President and CEO Jerry Macdaid.

"Sometimes it's hard for NTs," agrees Irwin. "They have an innate belief that if they get the right concept, everything else will flow from that. They believe that they're right so much that it's hard for them to draw in the perspectives of other people."

Clearly, some personality types will be more comfortable with the self-examination inherent in using tools such as MBTI. But folks (IS and otherwise) who are not naturally forthcoming will find that if they make the extra effort, it will pay off. "For us, Myers-Briggs was a turning point," says HP's Garvas. "It lit a fire when we realized that the diversity and differences are what made the team successful in the first place." Scary? Probably. Necessary? Absolutely, says Garvas. "It requires an emotional commitment, but until you have trust on a team, you really don't have anything else."

A Summary of the 16 Personality Types

ENFJ	**Imaginative harmonizer and worker with people.** Sociable, expressive, orderly, opinionated, conscientious; curious about new ideas and possibilities. 3-5% of the total population.
INFJ	**People-oriented innovator of ideas.** Serious; quietly forceful and persevering; concerned with the common good and with helping others develop. 2-3% of the total population.
ENFP	**Warmly enthusiastic planner of change.** Imaginative, individualistic; pursues inspiration with impulsive energy; seeks to understand and inspire others. 6-7% of the total population.
INFP	**Imaginative, independent helper.** Reflective, inquisitive, empathic, loyal to ideas; more interested in possibilities than practicalities. 3-4% of the total population.
ENTJ	**Intuitive, innovative organizer.** Aggressive, analytic, systematic; more tuned to new ideas and possibilities than to people's feelings. 3-5% of the total population.
INTJ	**Logical, critical, decisive innovator of ideas.** Serious, intent, highly independent; concerned with organization, determined and often stubborn. 2-3% of the total population.
ENTP	**Inventive, analytical planner of change.** Enthusiastic and independent; pursues inspiration with impulsive energy; seeks to understand and inspire others. 4-6% of the total population.
INTP	**Inquisitive analyzer.** Reflective, independent, curious; more interested in organizing ideas than situations or people. 3-4% of the total population.
ESTJ	**Fact-minded, practical organizer.** Aggressive, analytic, systematic; pushes to get things done and working smoothly and efficiently. 12-15% of the total population.
ISTJ	**Analytical manager of facts and details.** Dependable, decisive, painstaking and systematic; concerned with systems and organizations; stable and conservative. 7-10% of the total population.
ESFJ	**Practical harmonizer and worker with people.** Sociable, orderly, opinionated; conscientious, realistic and well tuned to here and now. 11-14% of the total population.
ISFJ	**Sympathetic manager of facts and details.** Concerned with people's welfare; dependable, painstaking and systematic; stable and conservative. 7-10% of the total population.
ESTP	**Realistic adapter in the world of material things.** Good natured, tolerant, easy going, oriented to practical, first-hand experiences; highly observant of details of things. 6-8% of the total population.
ISTP	**Practical analyzer.** Values exactness; more interested in organizing data than situations or people; reflective; a cool and curious observer of life. 4-7% of the total population.
ESFP	**Realistic adapter in human relationships.** Friendly and easy with people; highly observant of their feelings and needs; oriented to practical, first-hand experience. 8-10% of the total population.
ISFP	**Observant, loyal helper.** Reflective, empathic, patient with details; gentle and retiring; shuns disagreements; enjoys the moment. 5-7% of the total population.

SOURCE: CAPT INC.

The Paperless Factory

New software is designed to slash manufacturing cycle times.

by Srikumar S. Rao

Unlike much of the rest of American business, the typical U.S. manufacturer still operates in the technological dark ages. Sure, computers came to the factory floor years ago, but paperwork still reigns supreme there.

Why? Computer systems stand largely alone, each assigned to its own special task. Yet assembly operations must integrate information from all these systems. Manufacturing designs, for example, usually reside in a computer system in the engineering department, while work instructions may lie in a shop floor mainframe. Routing directives, detailing operational steps and indicating where the parts go next, are contained in a different system. The bill of materials, which lists the individual parts that production workers require, are nestled in still another. And the instructions, which could be print, audio or video, sit inside a relational data base somewhere else entirely.

Bringing all this information together is no easy task. Typically, photocopies are made of all relevant documents—drawings, instructions, lists and the rest—put in plastic sleeves and bundled together in a thick file called a "shop floor traveler." This file follows the job from station to station and gets thicker and thicker as details of the work done are recorded.

Meanwhile, workers spill coffee or oil on the traveler. File clerks inadvertently copy the incorrect version of a drawing. Papers drop out with constant handling. Copies are not always clear—someone's 8 is mistaken by another for a 3. If a production schedule has to be changed—a part hasn't arrived from a vendor, a machine breaks down—a new traveler has to be cobbled together, which takes into account all other related changes. This could halt production for days, or much longer if it involves such hang-ups as changes in engineering specifications.

"In a manufacturing plant, nothing moves until the information moves," explains Rick Hahn, vice president of manufacturing solutions for Itasca, Ill.,-based Cimlinc, which provides specialized manufacturing software to very large corporations.

Trying to save time by making do without a traveler is an open invitation to error. But the Cimlinc system replaces the traveler with display terminals on the shop floor. Each terminal is part of a local area network and shows all relevant information as work moves through various stages of assembly. It's set up to read files from all manufacturing and engineering systems and can handle text, diagrams, blueprints, photographs and audio and video files. A built-in security system permits no one but authorized users to see the data or add comments. Drawings and instructions are always current. Farewell, traveler.

Far more than convenience is involved here. Global competition requires companies to design and manufacture products faster while reducing costs. Targets have to be met with fewer people as ongoing personnel cutbacks reduce head counts.

Consider product design. Time was when engineering had pretty much finished a design before any other department got involved. With so much work already done, changes were resisted and many inefficiently designed products rolled off assembly lines.

The trend today is toward so-called "concurrent engineering," where other departments are involved in the design process from the very beginning. Manufacturing looks at whether a product can be made and whether design changes can simplify the production process. Procurement determines whether parts and subassemblies of required tolerances can be obtained and from where. Marketing gauges the degree of customer acceptance and works with sales to devise appropriate promotion strategies. Even the accounting department may chip in by evaluating the design for cost efficiency.

But the entire process is usually paper-based and sequential. Copies of all relevant documents wend their way from one department to another through the interoffice mail, collecting the required sign-offs. And when any department proposes significant changes, it's back to square one. Multiple copies have to be made for concurrent meetings, and scheduling these pose logistical hurdles. At meetings, comments are recorded on paper and passed on to the concerned department. There is no satisfactory mechanism to ensure appropriate follow-up by that department. And travel and lodging expenses start mounting if, say, the design group is in California and manufacturing is in Chicago.

Cimlinc's engineering system gets around all this by enabling engineers to E-mail a proposed product design to all concerned departments. The departments do not need their own design systems to open a file containing the blueprint. Instead, they can use the Cimlinc system, which copies the design from the engineering computer and provides simple software to manipulate it. They can mark up the design, insert comments and prepare "to do" lists, all of which are saved electronically. Engineering and production people can work on the same design from PCs at different locations and solve problems simultaneously. This, Cimlinc claims, can slash the time required to complete the work from months to weeks or even days.

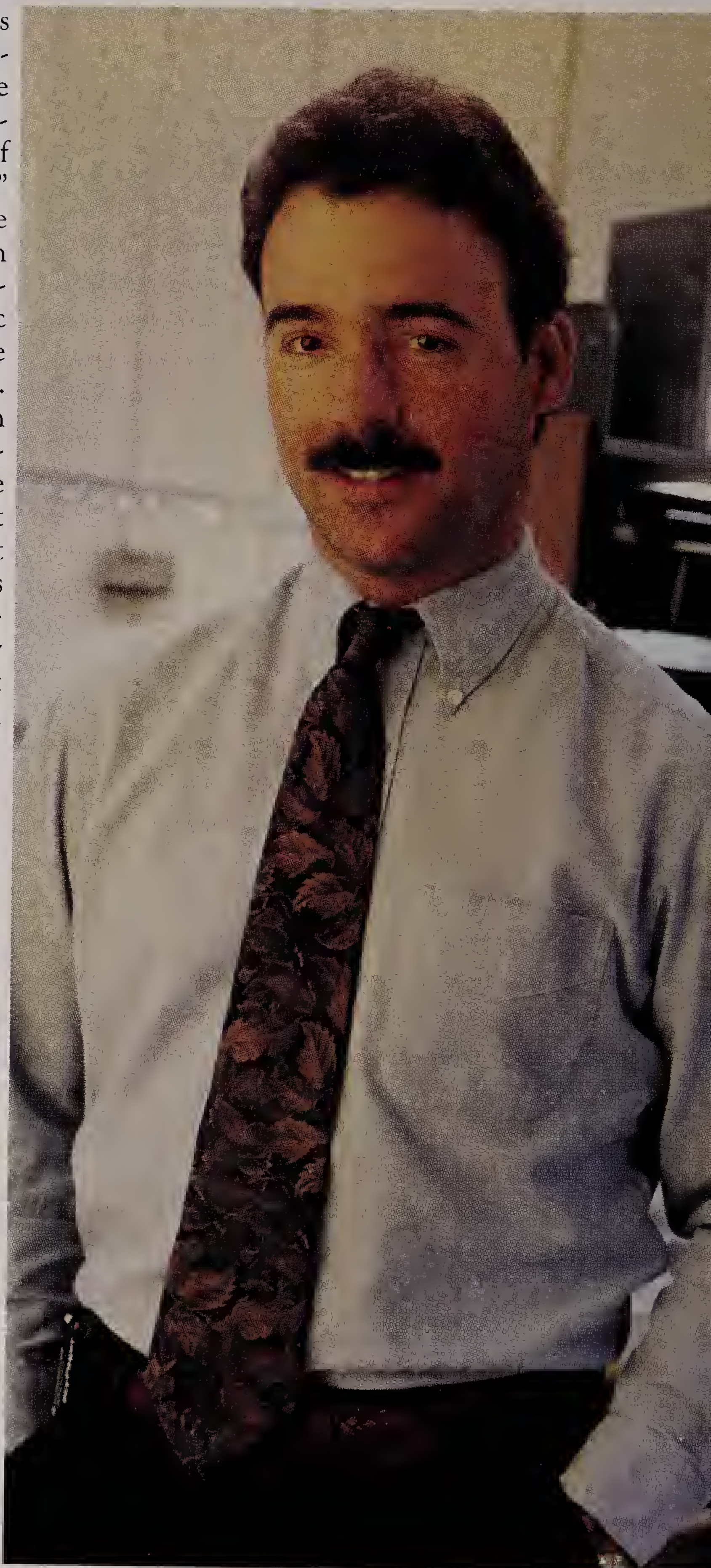
Other Cimlinc products, which help a company manage engineering changes, nonconforming products and so on, work the same way. They permit different departments, even when they're widely dispersed, to access a wide range of data residing in different data bases.

What's more, electronic records create an easily followed trail of accountability. This is useful for ISO 9000 certification—the European quality-assurance certification that is becoming a world standard—and in efforts to redesign manufacturing processes.

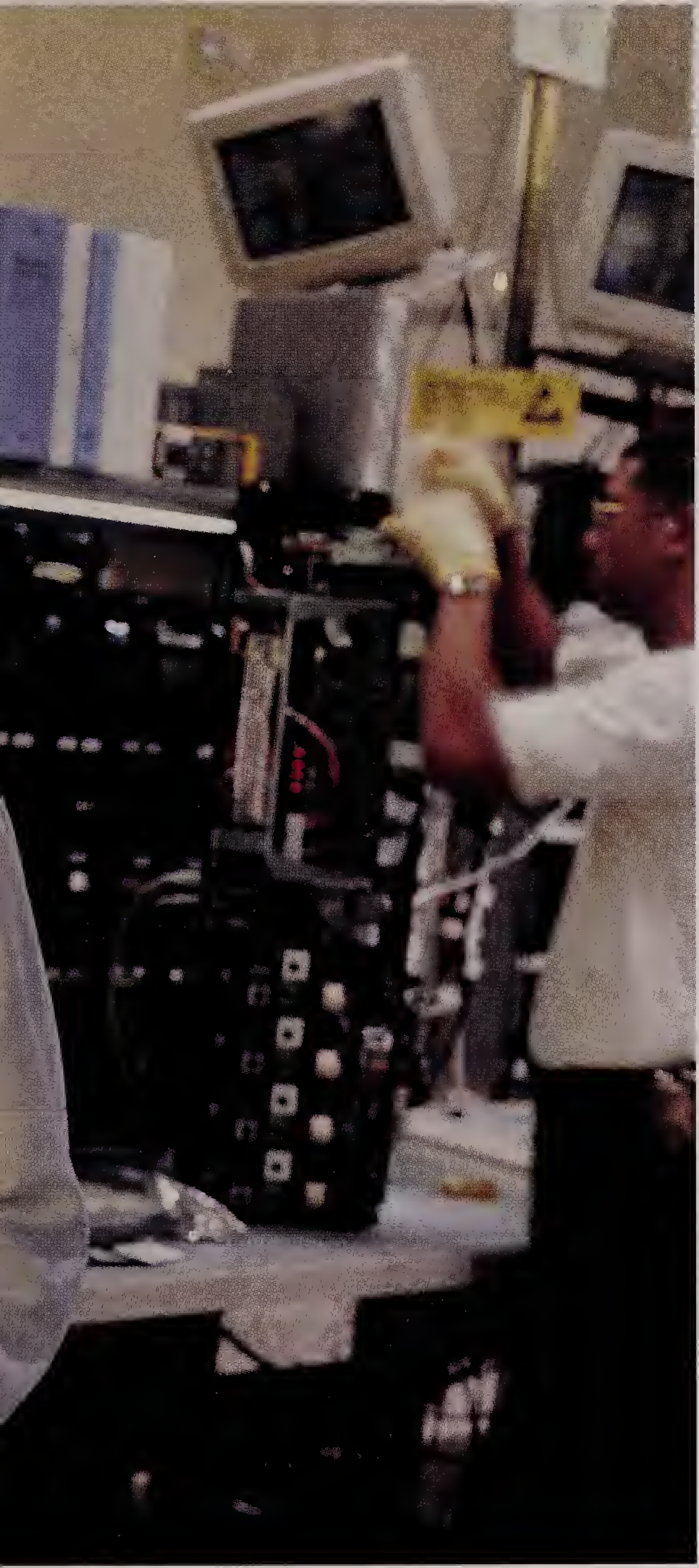
"The basic procedure followed by the company does not change," says Cimlinc's Hahn. "But it goes through an entire design or manufacturing cycle a heck of a lot faster."

Large companies with complex manufacturing operations are starting to seek advantages from this type of so-called "groupware." Pratt & Whitney, the aircraft engine division of United Technologies, is using Cimlinc software to try to solve a persistent problem. "Crucial information has to follow the engine along the entire assembly line and it does not always get there in time," explains Bill Scharfenstein, information technology manager for powerplant production. "The work instructions describe how the engine is to be assembled. Quality information gives details, such as results of tests performed. The 'as built' record identifies actual materials used to build a particular engine and needs to be updated as soon as possible with the serial numbers of the parts and modules that went into that engine. The engine history record sheet shows the engine's work status and any special steps that have to be taken before the engine is shipped," he says.

Scharfenstein expects Pratt & Whitney's reengineering effort to reduce the lead time for final assembly by more than 75%. Cimlinc software, with its ability to reduce paperwork, is an important part of this effort. There is an added benefit. "Our goal is to ship all documents, including the repair manual, with the engine," he says. "It now takes weeks after the engine is shipped for the documentation to be completed and sent to the customer."


Vincent Seidl, Applied Materials manufacturing manager of standard modules

Santa Clara, Calif.-based Applied Materials is a leading producer of fab-



ricating equipment used by semiconductor companies to produce computer chips. The company has been growing at a blistering rate of more than 30% per year—sales in fiscal 1995 (ending October) are projected to be nearly $3 billion—and its clients include Intel, Motorola, Samsung and Hyundai.

"Our problem is that all assembly documentation is paper based. Thick sheaves of paper organized into a 'station book' follow each machine along the assembly line," says Vincent Seidl, manufacturing manager of standard modules. "The station book includes parts and assembly drawings, assembly instructions, bills of material and quality information. Documents are constantly being revised and there is no guarantee that the book contains the current version of any particular drawing or list."

Seidl expects that Cimlinc software will reduce the search time for information and increase its accuracy by 50% or more. As the company gains experience with the software, plans call for its use in concurrent engineering and product design. "We have spent about $500,000 on software and associated hardware so far," says Seidl. "And we expect to recover the expenditure in a few months."

"Cimlinc has a unique ability to access data from a wide variety of data sources and manipulate it, and they have this niche to themselves."

Cimlinc's data integration capabilities permit companies with different computer systems to communicate despite this difference. "It will allow a company, such as General Electric's aircraft engine division, to share designs with Boeing," says Hahn. Boeing, under the gun to slash costs dramatically in the face of heavy competition from companies like Paris-based Airbus Industrie, has to completely revamp its operating processes to survive profitably. Advanced manufacturing software, provided by Cimclinc, is an important part of its reengineering process.

"Many companies claim that they have no competitors," says Bruce Richardson, vice president at Advanced Manufacturing Research, a Boston market research firm, "But Cimlinc really does not. They have a unique ability to access data from a wide variety of data sources and manipulate it, and they have this niche to themselves. The closest competitors would probably be document management companies such as Documentum in Pleasanton, Calif., and Novasoft Systems in Burlington, Mass., but neither one can interface with as wide a range of systems as Cimlinc can. As the size and potential of the market becomes apparent, other companies will jump in. Product data management companies like MetaPhase in Minneapolis, and Adra in Chelmsford, Mass., are already poised to enter the market with their own offerings."

Cimlinc CEO John West hopes to capitalize on its blue-chip customer base and take the company public later this year. "Boeing plans to install our product at 73 locations throughout North America," says West. "Our installed base includes world-class manufacturers like General Electric, Ford, AT&T and Mitsubishi. We want to set the standard, worldwide."

Analyst scrutiny will spur the company to keep refining its products, which are helping keep U.S. industry competitive. ■

photograph by PAM FRANCIS

Service Disservice

Can new software turn an old problem into an opportunity?

by Srikumar S. Rao

New customers are hard to come by, repeat business is crucial, and the words "total customer service" issue from the lips of every other management consultant.

So why are companies setting up systems that compensate employees for dissing customers? Screwy as it sounds, that's precisely what many are doing, if not intentionally.

Take customer help desks. Many employees are evaluated on the number of problems they "handle" in a given time period. Taken to its logical, if seemingly absurd, extreme, an employee who quickly alienates a customer to the point where he hangs up in frustration can outperform an employee who stays with a customer till his problem is solved.

Or consider product compatibility. You might put out an outstanding product, but if it doesn't work well with someone else's, your customer will be upset. The advent of client-server computing, for instance, has spawned networks that use hardware and software products from dozens of vendors. And the PC you or your neighbor bought last Christmas probably had preloaded software from a half-dozen different firms.

Yet companies typically train employees only on their own products and pass the buck on calls involving incompatibility with other products. Large numbers of irate customers returned CD-ROMs purchased during the last holiday season because they could not get them to play on their computer systems. Even companies traditionally known for excellent service, like Walt Disney, were left with egg on their faces as they mishandled this problem.

Like it or not, products are getting more complex—do you really know how to program your VCR?—and competition keener. Harried customers expect immediate help. There lies an opportunity as well as a problem. And technology is coming to the rescue.

"When a customer calls, most companies tend to treat it as a problem rather than a clue to providing a better product or service," says Ori Sasson, chairman and CEO of Scopus Technology, the Emeryville, Calif.-based provider of customer interaction software. "The attitude is, 'Let's get this guy out of our hair as soon as possible.' Companies have invested millions of dollars in computers and huge data bases but cannot provide useful customer information to the people who need it. If a customer problem gets reported to a quality assurance department, it gets stored in a discrete data base. Engineering, sales, product development, marketing and other business partners never learn what customers want, or, in the case of a problem, don't want."

So Scopus makes software that enables a company to pull together information quickly from a variety of data bases, organize it in useful ways and share information as needed with different parties. It works easily with the company's existing networking, E-mail and other software and hardware. And it includes bells and whistles such as sophisticated search features and the ability to assign responsibility for a task and track it to completion.

One reason Hugh Bishop, manager of emerging-technologies research at the Aberdeen Group, a Boston research firm, is big on Scopus is that its applications can be used by different groups in a single enterprise, as well as groups in affiliated companies. According to his estimates, this market is growing at better than 40% annually, and nearly 80% of the 500 largest U.S. industrial companies have "a major Customer Interaction System (CIS) initiative."

Consider:

- Synopsys, a Mountain View, Calif., firm with $240 million in revenues, provides software tools to companies that design integrated chips. With 1,500 employees, it operates in dozens of countries with a customer base that includes Hewlett-Packard and Intel.

Despite a complex product line, the company lacked an electronic call tracking system for customer support, instead relying on paper and a jury-rigged Macintosh-based program that its engineers put together. "It crashed regularly, once a day or more," recalls program analyst Wanda Anderson. "Our support people spent so much time logging on and fighting fires that they had no time to perform basic analyses such as categorizing types of problems and determining which products had the most bugs." Customers on hold used to hang up be-

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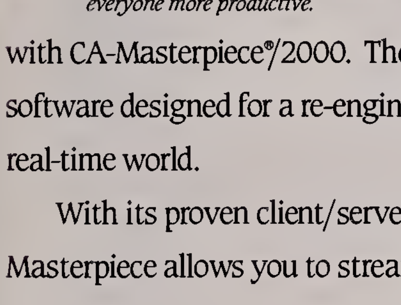

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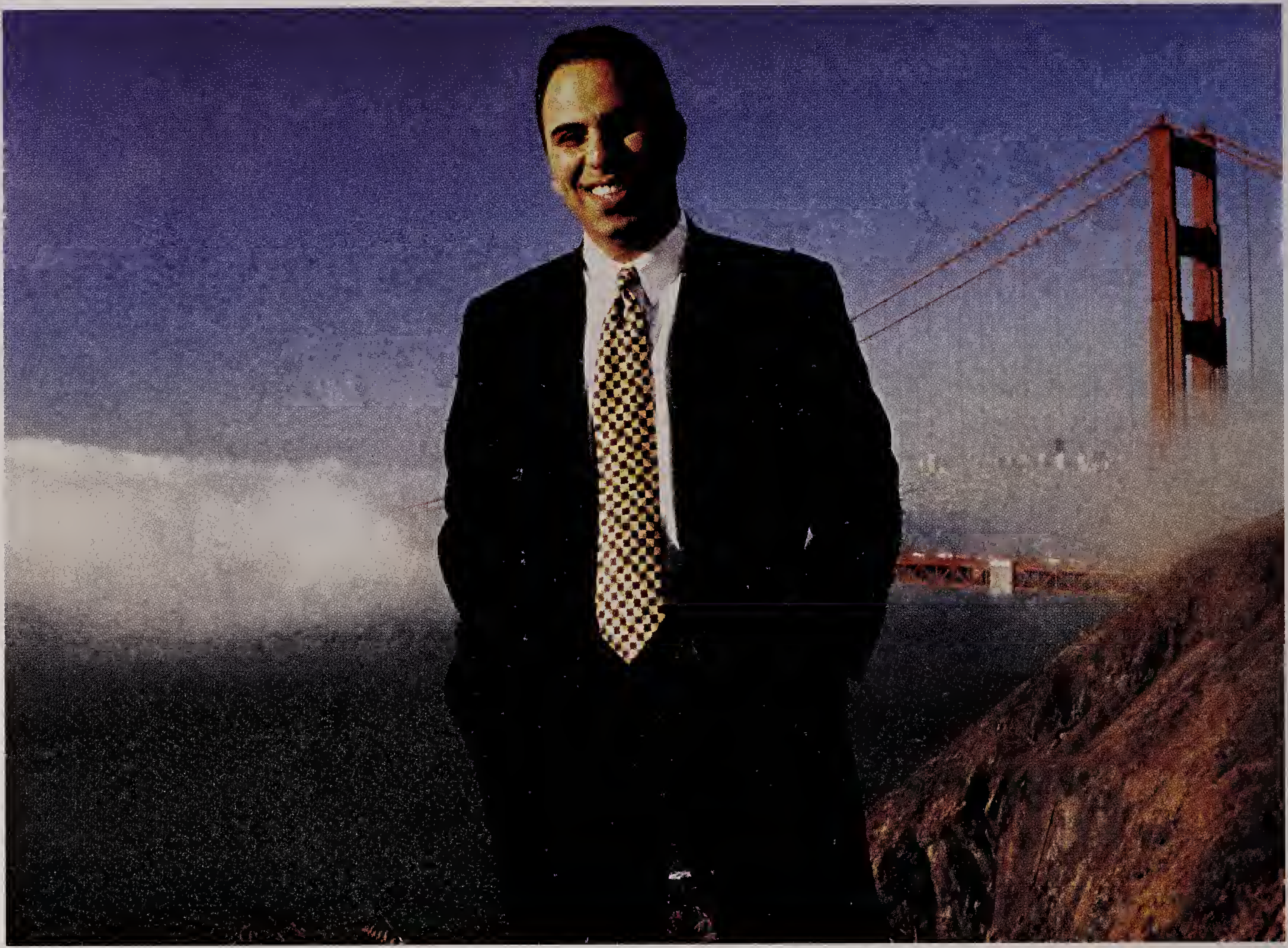

Scopus Technology CEO Ori Sasson

"When a customer calls, most companies tend to treat it as a problem. The attitude is, 'Let's get this guy out of our hair as soon as possible.'"

fore they got through. And it sometimes took hours to get back to them. Not a good way to build loyalty.

So the company installed a Scopus system. Not only are calls now smoothly handled, but extensive customer information is available to the engineers who man the support center. "With the prior system, only the last couple of months of customer history was available to the engineer," says Gene Tognetti, information systems manager for service systems. "With Scopus they can see three-plus years of detail about the customer. We know who is taking the most support and can direct additional training resources toward them."

Synopsys installed a data base accessible to the customer called SOLV-IT that lists the most common problems faced by customers, along with procedures for solving them. Many customers can get their queries answered without having to wait for human intervention and are delighted with its 24-hour availability. Requests for follow-up action automatically go to the department concerned, and the system rides herd on them until appropriate action is taken. If a help query, for instance, reveals that documentation needs to be revised, an E-mail notification is sent to the product department and the notification remains on the system until the revisions are made.

"Each engineer closes about 100 issues per month now, up from 60," says Tognetti. "We track the number and type of calls and relate it to product and release information. This permits us to improve the level of service we provide over the phone and modify our training curriculum. We also make sure that customer feedback gets to our R&D department so future products can be made better.

"In one recent case, one of our products would not completely redisplay a window after the application was restarted in a particular customer's environment. R&D was able to give the workaround within a day and include a resolution to the problem in a later release."

•Landmark Graphics Corp. of Houston is a $165 million-in-revenues firm that sells sophisticated software tools for oil exploration, extraction and reservoir management. The

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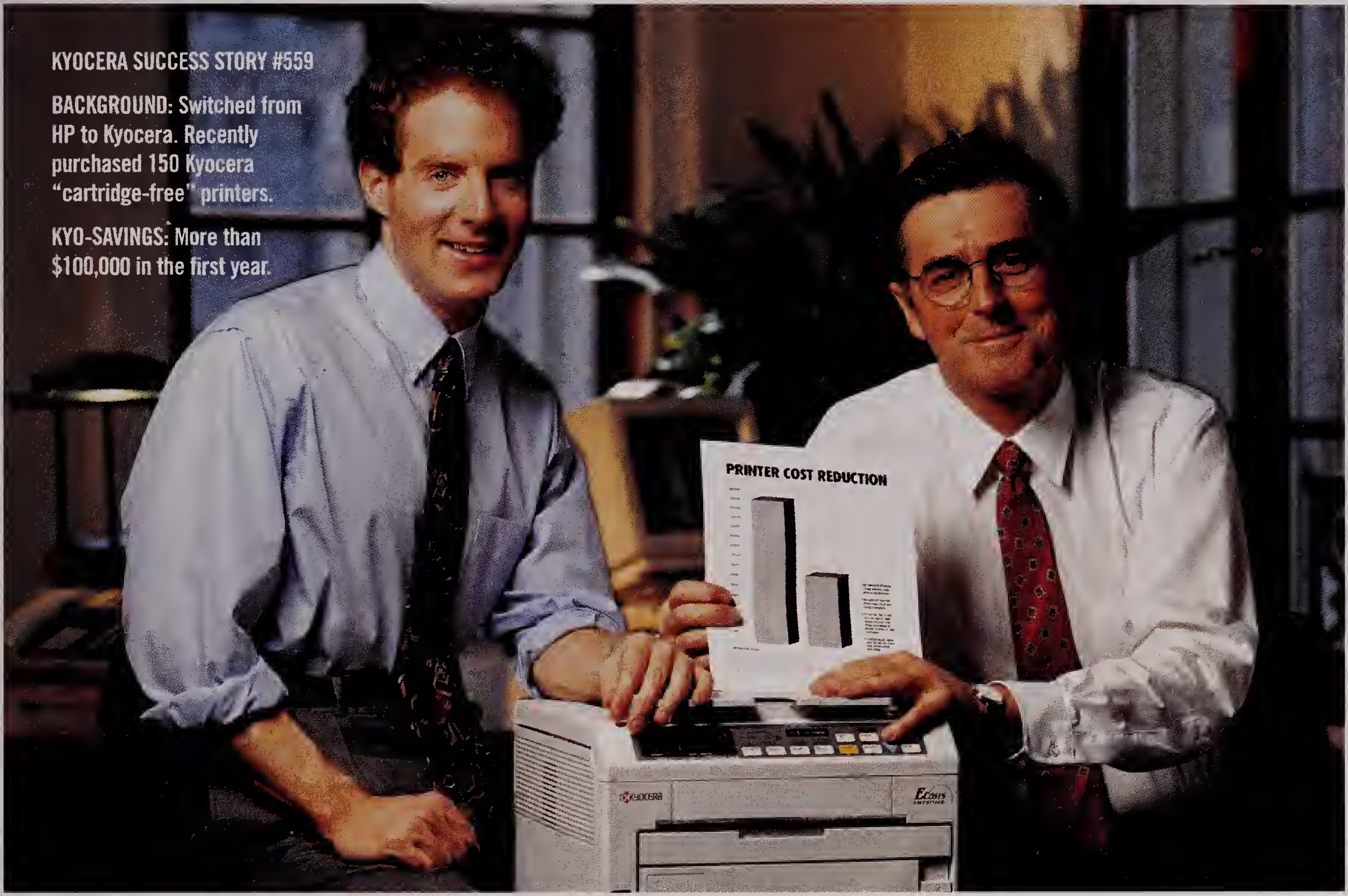

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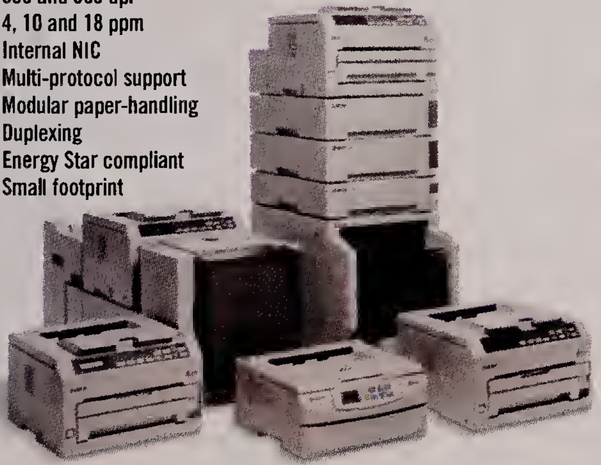

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company has support offices in more than 20 countries.

“We need to support our customers in Brunei as well as we can our customers in Houston,” says Geoffrey Morris, a manager of application support. “Much of the knowledge base on technical issues is with people who wrote the program, and they are mostly in our North American offices. We need to make information available to all parts of the world as soon as possible and it should be accessible 24 hours a day. Ease of use and robustness is essential for overseas users who often have poor telephone service.”

Chairman and CEO Ori Sasson (right) with vice presidents Bahram Nour-Omid, Sharam Sasson and Aaron Omid

The replication features built into Scopus programs solved Landmark’s problem. “We can put together a collaborative team of professionals who can be at different locations, even different countries, and crack tough problems as they arise,” says Morris. “Our testing shows that we can save about 40% of issue-handling time over what we used to have.”

•Dayton, Ohio-based Lexis-Nexis is a $700 million-in-revenues information retrieval company and a subsidiary of Reed Elsevier. “Our problem was that we had multiple problem-management systems that were not tied together,” recalls Mike Knellinger, senior director for information systems. “Telecommunications, information systems, the general help desk, all had their own programs and data bases. We had about a dozen systems that were not coordinated.”

Much time and effort was wasted as different groups of support staff tried to solve the same problems. It was impossible to make management use of information collected in areas like product design because information in different departments could not be combined.

It was a heterogeneous work environment, and the PCs and Unix work stations were connected together into a wide area network before Scopus software was installed. The company now has a centralized data base that acts as a repository for all problems and is accessible by all departments. “The new software has the ability to cut problem management time by up to 50%,” says Knellinger.

The big advantage of software provided by companies like Scopus is that it finally becomes possible for companies to become truly customer-centered. “In down-sized corporations, there is too much pressure on employees to understand hundreds of products and solve intricate problems for thousands of customers over the phone even though they may have limited training on the products. This is not practical,” explains Sasson. “What does make sense is for existing knowledge about the customer and the product to be placed in a repository where people who need it can get to it. This allows employees throughout the company to become familiar with the products quickly and solve customer problems even if they’re not yet knowledgeable about the product.

“For this to work, such a system has to let users share and extract information easily,” continues Sasson. “They should be able to type in a word or a phrase—say, the customer’s name—and immediately access all relevant information about the customer. On a technical level the system has to work in a distributed client/server environment, integrate well with many different kinds of computers and operating systems and be able to perform 24 hours a day.”

“Scopus has distinguished itself by devising software that can be used in a distributed fashion across several different organizations.”

The trend is for companies to distribute products through value-added resellers and outsource many corporate functions including customer service. These external firms do not always have the information needed to handle customer queries and problems satisfactorily. In this area, Scopus excels. “We are developing comprehensive distributed solutions that virtually tie companies together with their business partners and even the customer into a single extended enterprise system,” says Sasson, “Critical information needed is put into the hands of all employees and partners.”

Scopus faces competition from such companies as Vantiv Corp. in Mountain View, Calif., Astea International in Chalfont, Pa., and Brock Control Systems in Atlanta. But, as Aberdeen’s Bishop points out, “Scopus has distinguished itself by devising software that can be used in a distributed fashion across several different organizations.”

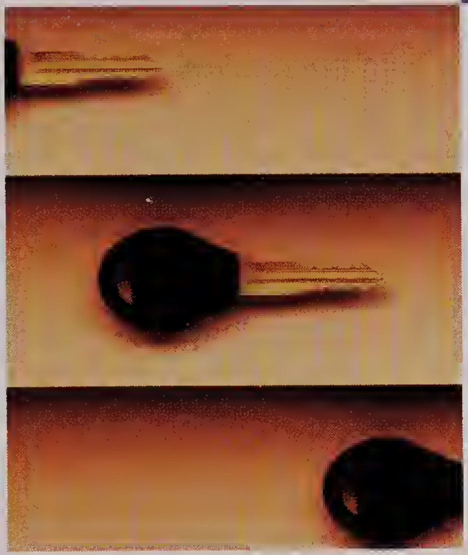
Little surprise, then, that Scopus’s revenues have grown at an annual rate of more than 100% a year for the last three years. ■

Srikumar S. Rao is chairman of the Marketing Department at the C.W. Post campus of Long Island University.

Legacy Renewal

Object Orientation

Enterprise Integration



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Hitting a Moving Target

Faster, easier and more timely data access and analysis. That's just the beginning of why OLAP is such a hot topic these days.

BY ALAN R. EARLS

The corporate headquarters of Bank of Boston, one of the oldest chartered banking institutions in the United States, peers down on many of Boston's historic landmarks that call to mind America's fight for independence. There's the Liberty Tree where Samuel Adams made his call for freedom, the old wharf from which Bostonians once served up their Tea Party and even the hallowed ground of the bloody Boston Massacre.

In contrast to its surroundings, Bank of Boston is not the kind of place that you'd expect to find a revolution by the pure nature of its buttoned-down, conservative reputation. But that's just what's been brewing there, thanks to a technology called OLAP, or online analytical processing.

The idea behind OLAP is, itself, revolutionary. For many large retailers, accessing data has meant tapping into the volumes of information produced by sophisticated OLTP (online transaction processing) systems and existing corporate databases. But by using OLAP's multidimensional database, users can access the strategic value of information hidden within the gigabytes of routine data that an organization accumulates from its daily operations. Instead of just using the information to keep shelves stocked and deliveries rolling, for example, OLAP seeks to discern key trends—the buying habits of customers or anomalies among retail outlets—that might point to management problems or hint at more productive marketing strategies.

ILLUSTRATION BY FRAN O'NEILL

That qualitative improvement in accessing and analyzing information will enormously enhance how effectively organizations manage themselves. And that, in turn, can spawn a revolution in thinking, as it has at Bank of Boston, according to Bob Geremia, project manager in finance reengineering.

In the case of Bank of Boston, there was certainly no lack of data. But a traditional mainframe-based decision support system (DSS), charged with the task of summarizing and reporting on the bank's wealth of information, simply couldn't keep up with 15 separate business units. Furthermore, since the system relied on data from up to 3,000 individually produced spreadsheets, it was cumbersome and provided little or no feedback to users responsible for many of the bank's key decisions.

In addition to taking a long time to assemble data, "it took another 18 hours to run every time we wanted information," recalls Geremia. That meant running the program only every few weeks. Now, an OLAP product—in this case Essbase Analysis Server from Arbor Software Corp. in Sunnyvale, Calif.—produces results in less than half that time, permitting the application to be used daily.

OLAP's great advantage is the way

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it provides information that can't be gleaned as easily from traditional databases. "With OLAP today, we are really talking about an extension of the spreadsheet model," says Rich Finkelstein, president of Performance Computing Inc., a Chicago consultancy. "Spreadsheets were originally envisioned as two-dimensional," he continues, "but people have gone further and further, connecting spreadsheets to provide additional dimensions." The result is that spreadsheets are maxed out. By addressing the desire for multiple perspectives upfront, he says, OLAP finally delivers the multidimensional functionality and ease of use the market has been seeking.

Robert Lendvai, marketing manager for Burlington, Mass.-based Cognos Corp., maker of an OLAP product called PowerPlay, likens the situation to sorting a jar of coins. If you dump all the coins on the floor, treating them as identical data items the way a traditional database query system would, you couldn't derive much knowledge about them. "Only an idiot savant could tell at a glance how much money there was," he says.

OLAP technology, on the other hand, is like stacking the coins in groups—of five, or 10 or a dozen, depending on your purpose or preference. OLAP, Lendvai explains, also permits grouping the coins by value, year, mint mark or country of origin.

"OLAP has been around in some form or another for many years, but in the last year or two it has really taken off," says Claire Gillan, an analyst with International Data Corp. in Framingham, Mass. Gillan says part of the technology's success also is due to its increased ease of use. "Most of the newer OLAP products have a GUI interface, and some allow a familiar spreadsheet interface as well," she says. Furthermore, the involvement of major corporations in the technology, particularly Oracle's purchase of IRI Software, bodes well for its future, adds Gillan.

Yet, despite Gillan's upbeat assessment, there remain fundamental differences in approaches among different vendors, and those differences highlight different ideas about how to make good on the tantalizing promise of OLAP.

The debate arises from the differing lineage of current OLAP practices. Kirk Cruikshank, vice president of marketing at Arbor Software, refers to one simmering OLAP controversy. He explains that E.F. Codd, widely regarded as the father of relational database technology, gave OLAP its name and conceptual blessing in a 1993 white paper supported by Arbor. "Since then, there have been ongoing arguments regarding whether OLAP needs a formally structured multidimensional database or whether it can utilize any relational database," he says.

OLAP seeks to discern key trends that might point to management problems or hint at more productive marketing strategies.

Gillan agrees that the issue has been controversial but says that many products have proven their ability to extract information from existing relational databases. But plenty of confusion certainly remains. And no wonder. Some of the concepts mentioned under the rubric of OLAP include data warehousing, drill down, DSS and even the broader category of business information systems (BIS)—all of which have been defined by some as OLAP.

The confusion exists because vendors and industry watchers design definitions to favor one product over another, says Richard Creeth, co-author of "The OLAP Report" and president of Business Intelligence Inc. in Norwalk, Conn. "A neutral definition shouldn't dictate which technologies to use," he says. "OLAP can be defined in just five key words: fast analysis of shared multidimensional information. Multidimensionality is the single most important requirement—the essence of any OLAP application or product."

Yet another wrinkle in the OLAP picture comes from service providers that harness OLAP technology to their own proprietary data and data belonging to clients. The marriage of the two data sets produces something that an individual company would be hardpressed to create on its own. "The great dilemma is what to do with the crystal ball," says Jiri Nechleba, senior vice president and general manager at Nielsen Solution System in Schaumburg, Ill. His organization, a unit of market research giant A.C. Nielsen Co. (of TV-show-rating fame), boasts about its ability to predict buying trends from its many terabytes of data residing in what Nechleba describes as "one of the largest Hewlett-Packard installations in the world." On tap is information about hundreds of thousands to millions of individual products, along with detailed information about sales at specific locations. "For instance, if someone wanted to connect consumer trends in, say, Chicago, with the ingredients listed on cereal products that claimed to be 'healthy' versus those that are 'low fat,' we could tell them," he claims.

Older systems, built under a "just-in-case" model, required designers to anticipate and include all the information and analysis they thought the user would need, says Nechleba. OLAP uses a just-in-time model: Users decide what they want, and OLAP provides it on the spot.

With a focus similar to Nielsen's—proprietary market data plus data from clients—Epsilon Inc., a subsidiary of American Express Co. Inc. located in Burlington, Mass., is also encouraging its Fortune 500-size clients to adopt OLAP technology. Pushing the boundaries of the OLAP frontier, Epsilon has begun using powerful parallel processing systems—including two Scalable Power Parallel systems from IBM Corp.—to move through more data faster than ever. "We are also exploring ideas like neural networks and ge-

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netic algorithms," explains Epsilon Director of Technology Assessment Robert Hill. "You can't do that without human intelligence, but we are working toward a query system that will be self-tuning," he says.

Mainstream OLAP, however, is much less exotic and more affordable than Epsilon's, or what Nielsen's Nechleba calls his multimillion dollar "engagements with clients." In fact, notes Gillan, only a few companies are currently considering parallel processing as support for OLAP, although its advantages for looking at multidimensional data are clear.

IRI Software, the Waltham, Mass., organization recently purchased by Oracle Corp. in Redwood Shores, Calif., relies on technologies whose roots go back to the late 1960s and include the organization's extensive experience with commercial DSS. Its Express products function with most any database system. IRI Software's Jeffrey P. Stamen, formerly the company's president and now senior vice president of the OLAP products division of Oracle, says OLAP really delivers on the promise of MIS as enunciated in the 1970s. "The concept then was to make information an asset that people could readily use." But back then, as Stamen notes, the gap between what managers needed and what technology could provide was still enormous.

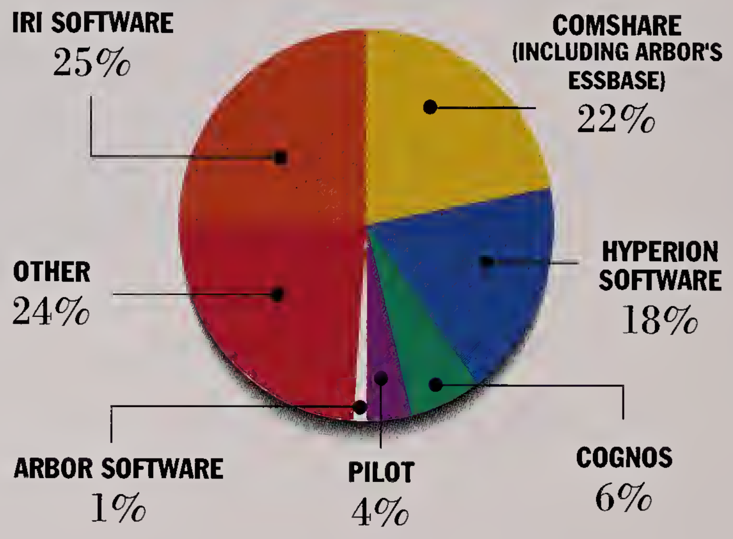
"DSS came along in the 1980s and focused on a narrower goal, giving lots of data to a few specialists," he continues. Now, Stamen says, OLAP is allowing much larger groups of people to get the information they need in the way they want it and in a timely fashion.

One IRI customer playing in the highly competitive and fast-moving telecommunications arena is BCTEL, the leading telephone company in British Columbia. BCTEL sought a better way to get at data on customers and market trends. Also crucial, explains Greg Faust, BCTEL's decision support systems manager, was having a system that would be easily reconfigurable, particularly if market regulations changed. After looking at a number of mainframe-based products, Faust settled on Oracle's Express.

A Look at The Players

The developing OLAP market is marked by rapid change and numerous vendors

VENDORS' SHARE OF OLAP MARKET IN 1994



SOURCE: BUSINESS INTELLIGENCE INC.

"By comparison with what we can do today, our old mainframe system was crude and limited," Faust says.

What's more, the new OLAP system correlates information residing in databases that never before "talked" to each other. So, now information is increasingly standardized across the company.

That, says Stamen, is precisely the point. Older systems could only look at data as it had been summarized within databases. OLAP, he says, permits deeper and wider analysis of all the data a company already has. In one case, he notes, a customer discovered a data mismatch that caused millions of dollars in product to be shipped without any billing activity.

Echoing Stamen, Nechleba says, "What we are doing with OLAP is solving business problems." To do that, he says, customers often must be schooled in the value of disaggregating data. "We try to manipulate data at the root level because, if your filters fall below the level of aggregation, you are just fitting your solution to the data."

Yet, despite the power of OLAP, vendors admit some companies may not have the specific problems that OLAP is best suited to address. Stamen, for one, says companies considering OLAP need to have three things: a data environment that can support OLAP, users with needs that can be defined and technology that fits both users and the data environment.

"Look around your business for problems that are multidimensional," adds Gillan. "Their complexity will determine whether you need to go with a multidimensional tool or a traditional spreadsheet approach," she says.

OLAP alone may seduce IS departments, warns John Kopcke, CTO of Pilot Software in Boston. He describes his firm's Lightship OLAP solution suite of client/server products as business information systems that also happen to embody OLAP technology. But without a full context for its operation, OLAP may be ineffective, he says. "We recommend that companies adopt technology and get people using it as quickly as possible. They can then develop a structure that encourages continual change. That way they can continue to specify what users really want rather than trying to live with something for a year that doesn't really work."

Despite internal divisions within the industry, and an experience base that is still relatively narrow, OLAP proponents are confident. "We think the modern organization needs OLAP and will want to deploy it widely," says Cruikshank. "The payback on this technology will be measured in months, not years," he adds.

Alan R. Earls is a freelance writer based in Franklin, Mass.

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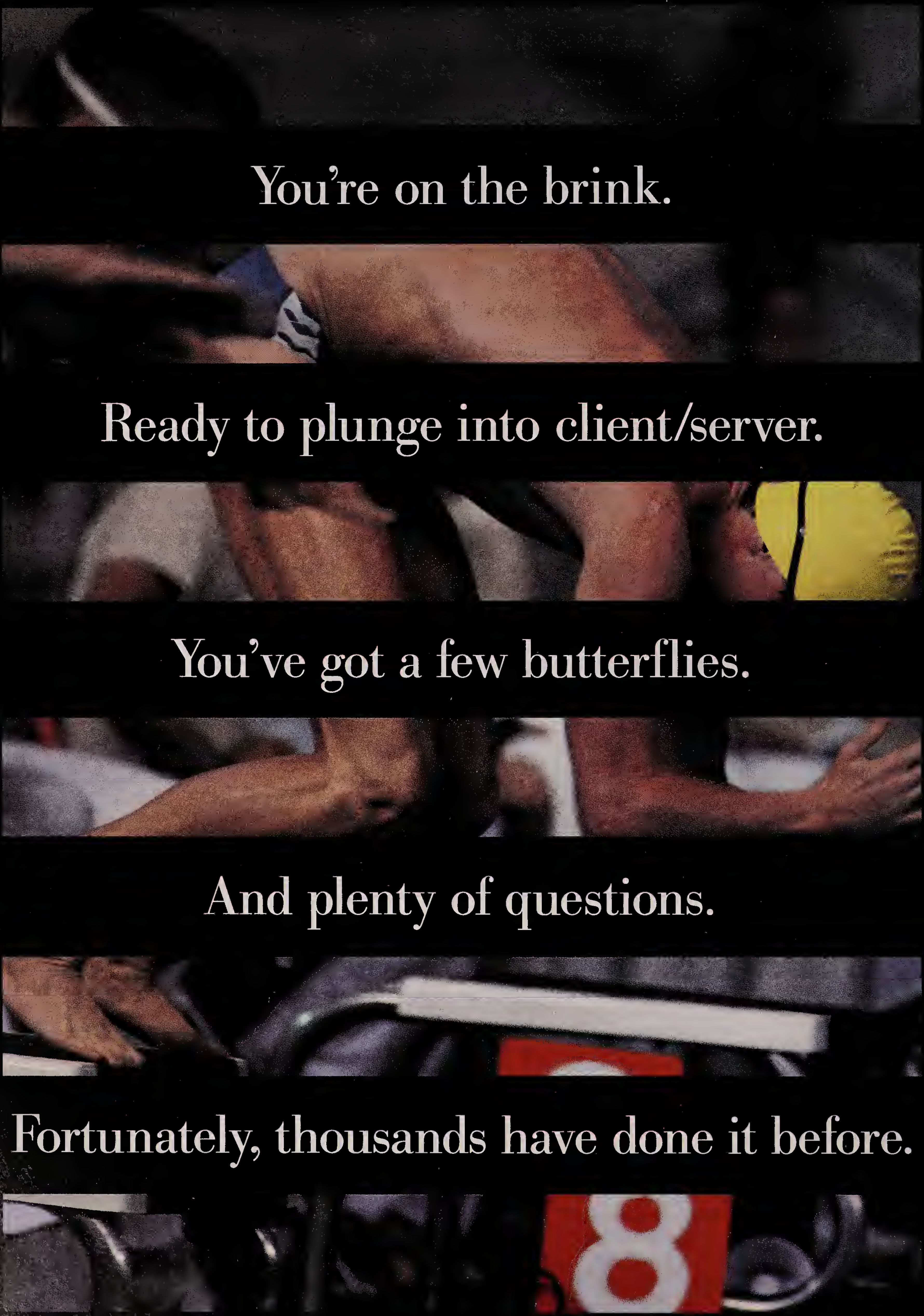
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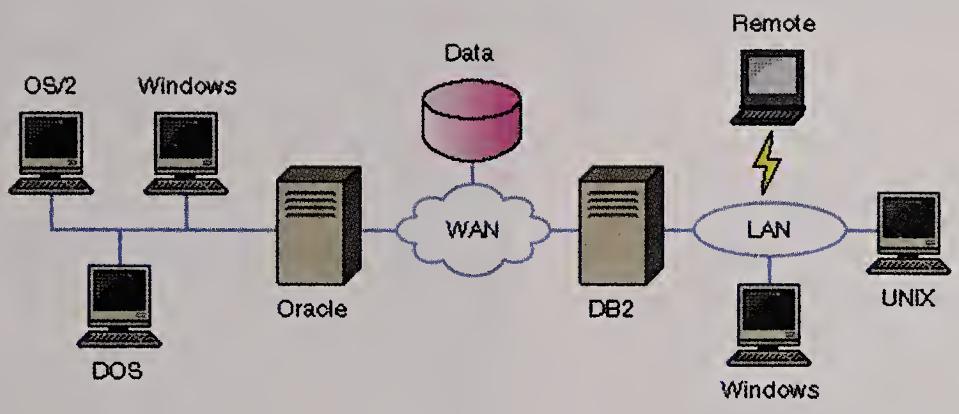

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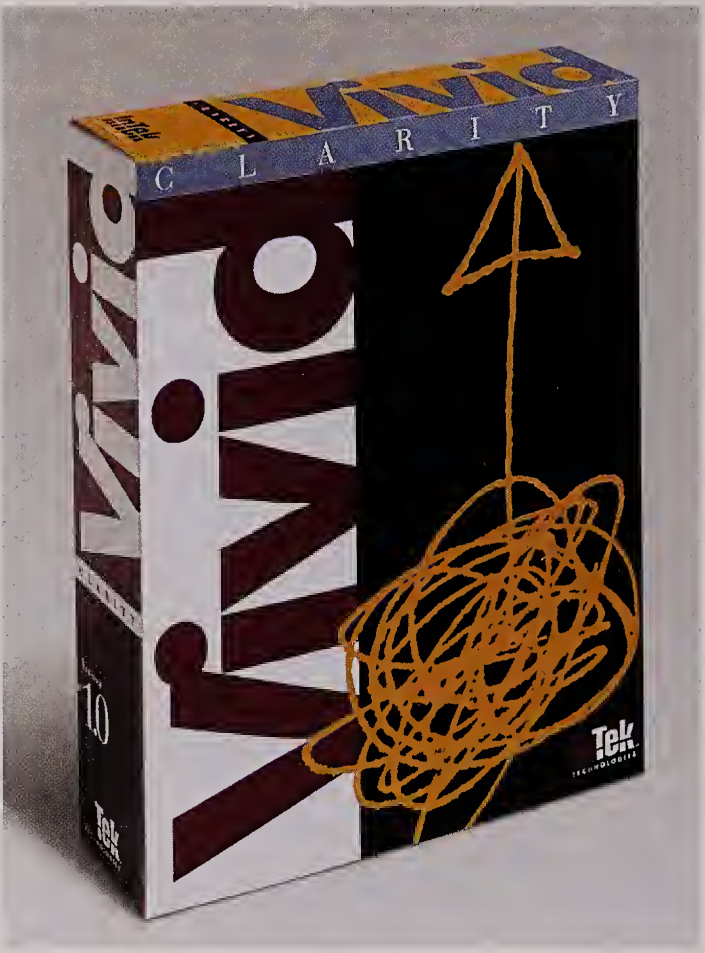

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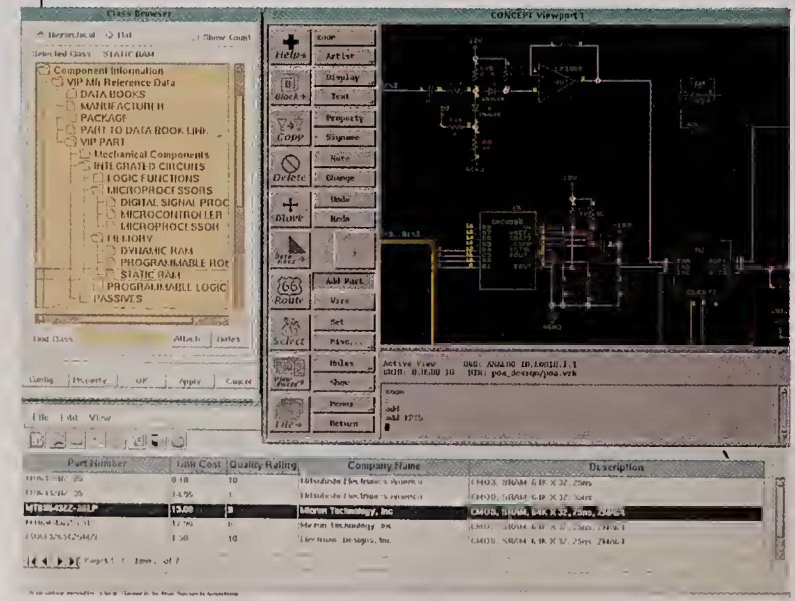

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Hard Sell

No matter how smart a company's sales strategy, IS still must sell the technology to its toughest customer—the sales department

Bigger may be better, but it's not always easier. As companies grow and the range of products and fields of distribution increase, communicating with the field sales force—already notorious for resisting high-tech solutions—becomes even more exacerbated. At least that was the case for Steelcase Inc. in Grand Rapids, Mich. One of the world's largest sellers of office furniture, the company's managers took to heart the problem of sales-force communication when they decided to automate its field sales activities.

Given Steelcase's vast array of product styles, configurations and finishes, getting the best price for a customer took time because it meant field sales reps had to access antiquated independent silo data storage systems that didn't communicate with each other. "In addition, the field sales reps often needed to contact as many as 18 to 22 different people within the company to make a pricing decision," says In Tandem Project Manager Dave O'Brien. "The delays would lead to a loss of customer goodwill and, ultimately, to a loss of business."

But all that has changed. "We decided to go to a DB/2 relational database, using tools like SQLWindows to write sales automation applications and provide information to our sales organization," says O'Brien. "The sales reps, in turn, can access the information and respond quickly to our dealers and customers." In hindsight, O'Brien sees the technology solution as the easy part. In defining the need for change, he recalls, the project team ran into a problem that was bigger than the process alone: They faced the job of converting a field sales force that was hostile to new technology.

It is a common problem, already well documented. In a 1994 survey, market researcher IDC in Framingham, Mass., identified the field sales force as the most resistant to change, "the last frontier of white-collar automation."

Critical to the success of a plan to automate the sales force, the report concluded, was top-management support, a cooperative relationship between MIS and end users, and comprehensive training. The rewards for such a plan include increased productivity, faster response times and—that Holy Grail of IT—competitive edge. Improved employee relations and better data and data access were other bonuses.

At Steelcase, O'Brien, Technology Leader Dan Kallman and Communications Leader Bill Kinsman together formed a cross-functional core management team to analyze needs and procedures. Most important to them was a focused game plan and clearly defined goals to avoid hidden problems and costs.

Because the staff was dealing with data and systems they already understood, O'Brien says, they managed to shave months off implementation time. In addition, several Rapid Application Development sessions designed to clarify business requirements and subsequent pilot programs to validate those requirements helped smooth out problems and increase awareness and cooperation, says O'Brien.

As a result of the new process, the company's field-based pricing decisions, which previously could take weeks for large or complex orders, are now done in a matter of hours. "We can go from the quote process right into the order entry process using seamless automation, from the time the customer requests furniture pricing to the time we bill and ship to the dealer," says O'Brien.

Key to overcoming their "fear of new technology" was connecting the field sales force with the cross-functional team, O'Brien claims. "Out of that came a common understanding of the business values and benefits and a common language. We discovered that we had, in fact, been communicating—we just didn't understand each other."

Stephen Mills is a freelance writer based in Brooklyn, N.Y.

VITAL STATISTICS

Organization: *Steelcase Inc., Grand Rapids, Mich.*

Application: *Sales-force automation*

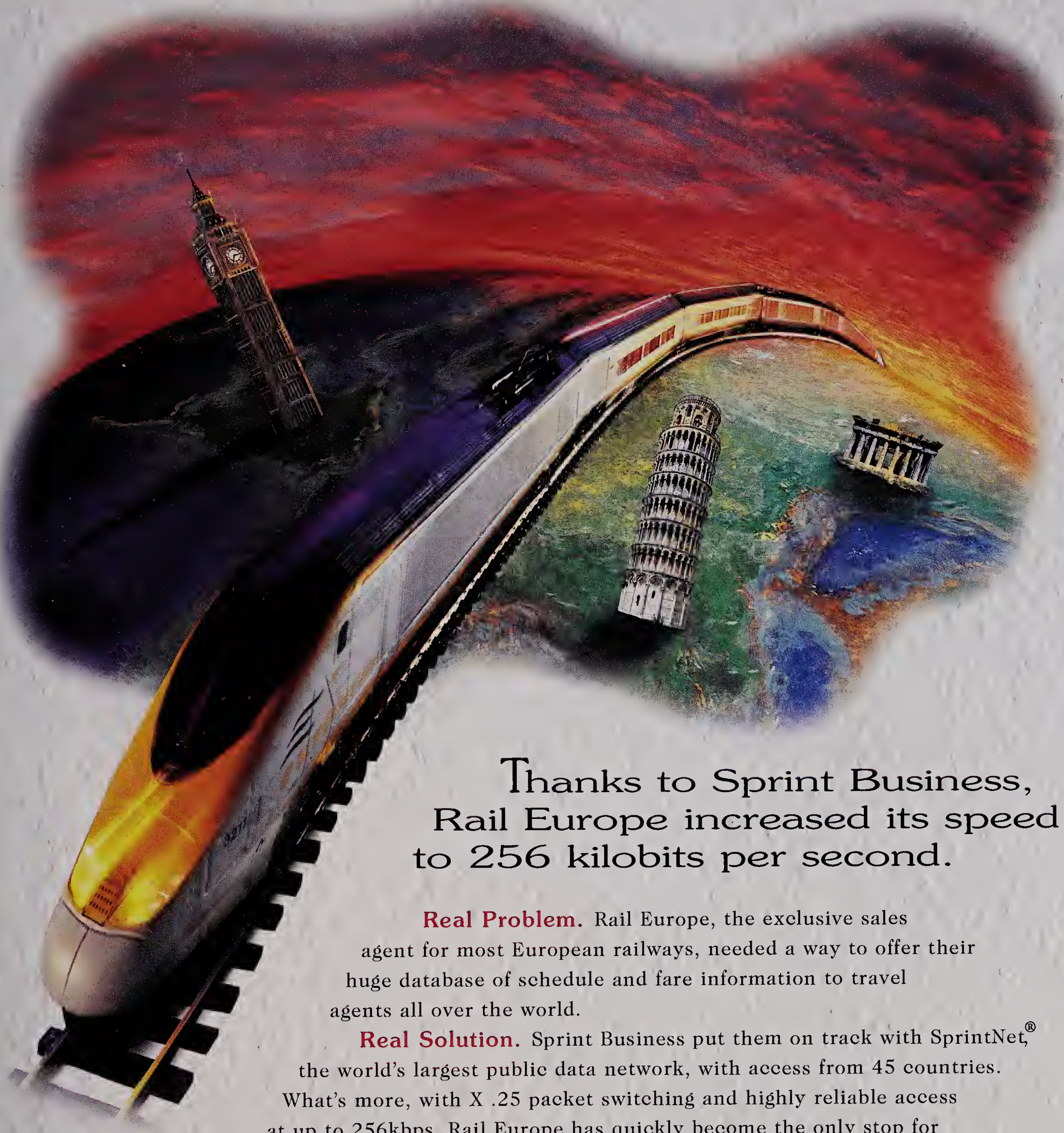
Technologies: *Client/server application developed using SQLWindows in a Windows 3.1 environment accessing information in a relational database (DB/2); LAN, WAN and dial-up access using AT&T Globalyst Notebook computers and other Intel-based desktop machines; internal cross-functional development and deployment of each system component*

Scope: *Over 500 users in the U.S. and Canada*

Sponsors: *Dave O'Brien, in tandem project manager; Dan Kallman, technology leader; Bill Kinsman, communication leader*

Objective: *To streamline the sales and sales-quote process and to provide online sales information access to front-line sale*

Payoff: *Increased win ratio on higher-volume deals when the system is used; the system also brings new discipline to an existing process*



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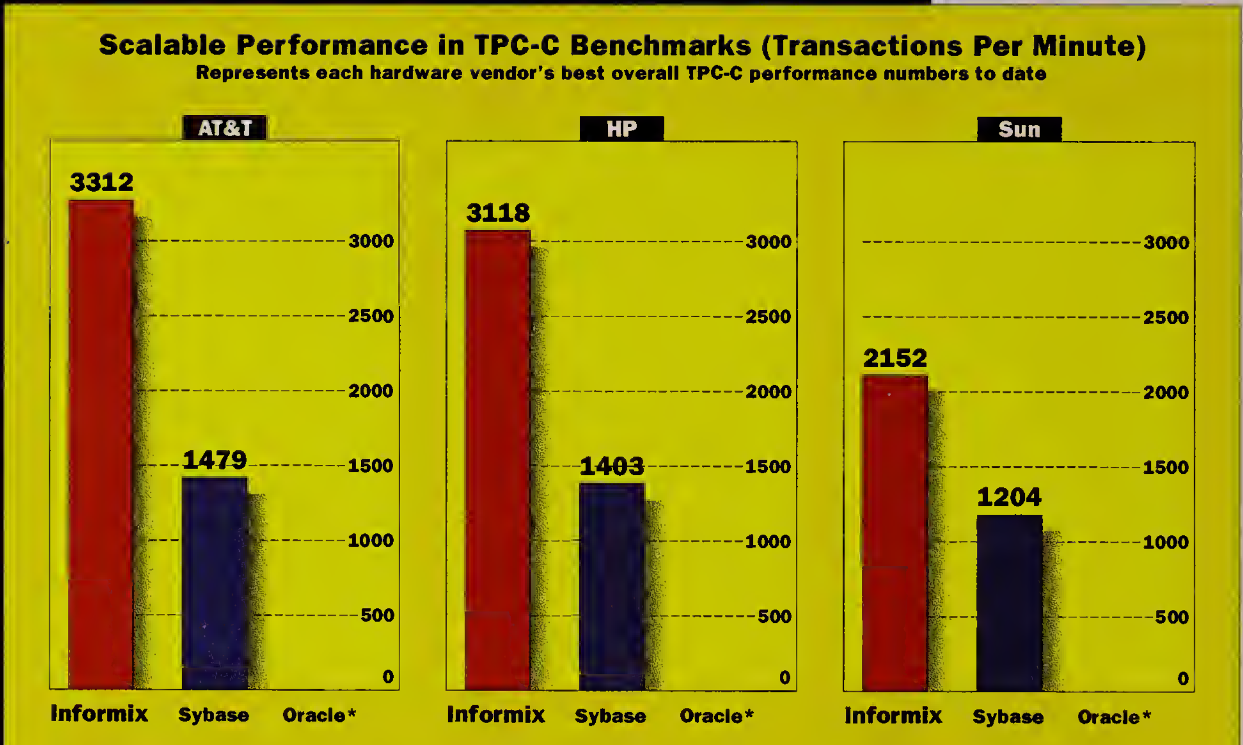

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*Oracle has not submitted TPC-C performance numbers.

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